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MATHEMATICAL MASTER AT THORPE-ARCH SCHOOL, YORKSHIRE:
AUTHOR OF 'EXPLANATORY MENSURATION.'

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PREFACE.

It is not intended that this short Collection of Arithmetical Examples should at all supersede the use of an ordinary Arithmetic, but it is hoped that it will prove a useful help to *all* Students in Arithmetic, but more particularly to all Candidates for the Oxford and Cambridge Local Examinations.

The work contains nearly all the Questions that have been proposed by the Examiners in the Oxford and Cambridge Local Examinations since their institution.

It will be found also that the Questions are framed, not so much with the intention of teaching the merely mechanical parts (Multiplication and Division) of Arithmetic, as of calling out a pupil's reasoning faculties, and of constantly keeping before him the principles of Arithmetic. The great majority of the Examples, when once their meaning has been thoroughly understood, require but little labour in working out the result. A pupil of ordinary ability will thus be able to work through all the Examples within a reasonable time, and without feeling himself troubled *unnecessarily* with tedious Multiplication and Division.

It is hoped that this work will prove very useful—

I. To Candidates for the Oxford and Cambridge Local Examinations. Though they have gone through an ordinary Arithmetic, still it will be found desirable that they should spend the last few months in running over a few sums under each rule, and it is believed that this collection will furnish a sufficient number of Questions for that purpose.

Besides, it possesses the additional recommendation of presenting the Candidates with the very Questions that have been proposed in the Local Examination Papers of previous years.

II. To pupils whose principal time is devoted to the Higher Mathematics, or who have gone through an ordinary Arithmetic.

A master has often great difficulty in finding a collection of Examples which will compel a pupil to think and to use all the ingenuity he possesses, but at the same time will not weary him with a great amount of *needless* figure-making.

It is hoped that this collection will answer that purpose satisfactorily.

III. As Examination Papers for testing the real knowledge of a class *after* they have gone through any rule in Arithmetic.

The Questions are generally of such a practical character, and are worded in such a variety of ways, that they cannot but prove useful tests of a pupil's real progress. Let a master place this collection in the hands of a class *after* they have worked through an Arithmetical rule, and he will then be able to see how far they have thoroughly understood what they have been doing.

Any correction or any suggestion for the improvement of the work will be most thankfully received.

A. HILEY.

THORP-ARCH SCHOOL, YORKSHIRE.

PREFACE TO THE SIXTH EDITION.

THE FORMER EDITIONS of this work have contained only the more difficult Arithmetical Questions that have appeared in the Universities' Local Examination Papers of different years, and they have not been marked out in any particular manner from the rest of the Questions.

In the present edition, however, with the kind permission of the Cambridge Syndicate, *all* the questions, whether easy or more difficult, which were proposed in the last Cambridge Local Examinations (1873), to both senior and junior candidates, have been inserted, and notes in the margin show whether they belong to the Senior or Junior Paper.

It is hoped that this new feature of the work, which has been introduced into this new edition, will add considerably to its value.

The plan of inserting the *whole* of the Examination Papers, instead of *selected portions* of them, will, with the kind permission of the Cambridge Syndicate, be continued in future editions of this work.

A. HILEY.

THORP-ARCH SCHOOL, YORKSHIRE.

PREFACE TO THE NINTH EDITION.

THE WORK for this new edition has been thoroughly revised, and some corrections have been made in the Answers.

By the kind permission of the authorities in the Universities of Oxford and Cambridge, the Oxford Local Examination Papers, the Cambridge Local and also Higher Local Examination Papers, down to the present time, have been inserted.

To add to the usefulness of the work, I have obtained the kind permission of the different authorities to insert papers set at the Oxford and Cambridge Schools Examinations, the Royal College of Surgeons, the Incorporated Law Society, Responsions at Oxford, the Previous Examination at Cambridge, and the Matriculation at London University.

ALFRED HILEY.

THORP-ARCH SCHOOL, YORKSHIRE.

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NOTATION AND NUMERATION.

Write down in figures—

(1) Sixty-seven thousand and ten.

(2) Nine hundred and ten thousand five hundred and eleven.

(3) Six hundred thousand and one.

(4) Fifty thousand and fifty.

(5) Seven hundred thousand seven hundred and seven.

(6) Twenty millions fifty thousand and fifty.

(7) Three hundred millions seven thousand and ten.

(8) One hundred millions forty thousand seven hundred and six.

(9) Five thousand millions fifty thousand and fifty.

(10) Seven thousand and seventy millions four hundred and fifty-three.

(11) Six hundred and thirteen millions twenty thousand and three.

(12) One million and a half.

(13) Two millions and a quarter.

Express in words—

(14) 20010. (15) 270056710. (16) 3000701.
(17) 6135967005. (18) 7250005. (19) 3670005005.
(20) 9867345107. (21) 3007954005279.
(22) 3500010060967

SIMPLE RULES.

ADDITION.

Add together—

(1)	67895672	(2)	79	(3)	201278909
	5760097		5425769		6529763
	39		37957		3789
	46787		576928		256970
	895233009		4963879		7689
	39678		807653		4
	9986759		9		986586

(4) Find the sum of 6290, 764, 613, 4731, 5214, 289, 3102, and 41.

(5) What will be the sum of 10467530, 37604, 6325493, 41320, 856758, 459, 2940275?

(6) 92 + 853 + 7654 + 65432 + 543210 + 4321098 + 321976 + 2109 + 1098 + 182.

(7) Collect together nine hundred and nine, nine thousand and nine, ninety thousand and nine, and eleven hundred and eleven.

(8) What will the following amount to: Ten thousand and forty-seven, three hundred and five, sixty-seven, three millions fifty thousand and ten, nine, sixty-seven millions and a quarter?

(9) What will be the sum of thirty-six, eleven, six hundred thousand and one, ten, twenty-eight millions three hundred, six hundred and sixty-seven, four, one hundred, two millions and a half, three?

(10) The population of the West Riding of Yorkshire a short time ago was 1325495, of the East Riding 220983, and of the North Riding 1350121. How many people were living in Yorkshire?

(11) The war expenses between England and France were in 1812, £103421538; in 1813, £120952657; in 1814, £116843889; and in 1815, £116491051. How much was spent in war by the two countries during four years?

SIMPLE SUBTRACTION.

(1)
36579601
12395798

(2)
20035067
9997689

(3)
123450067
92389909

(4)
26573989
2312312508

(5) 567823467 − 9980789.

(6) 1200342678 − 98302568.

(7) Find the difference between thirty-seven millions five thousand and five, and nine hundred and fifty-six millions and one.

(8) How much do four hundred millions exceed four hundred and four thousand and four?

(9) Take thirty-nine thousand and one from a million and a quarter.

(10) Subtract 675213 from 32110012.

(11) Take 3003675 from 92501011.

(12) If the minuend is 9375001 and the subtrahend 369899, what is the difference?

(13) How much is a thousand and fifty-six less than a million and one?

(14) The sum of two numbers is 4327, and one number is 697. What is the other number?

(15) The greater of two numbers is 90001275, and the difference is 9987597. What is the other number?

(16) In the half-year ending December 31, 1852, the total number of passengers conveyed by railway in the

United Kingdom was 49880112, of which 5853214 were first class passengers and 17524051 second class. How many passengers travelled either by the third or fourth class?

(17) Collect 397+9675+4−5069+7−89+59.

(18) Find the value of 30967+367−4789−3−1567+11.

(19) What number added to eight hundred and five thousand nine hundred and sixteen will make a million?

(20) What number must be added to seven hundred millions four hundred and six thousand five hundred and four to produce eight hundred millions?

(21) The population of the different parishes and districts of a large town are 16640, 321, 3760, 3906, 5144, 2684, 13360, 391, and 5797 respectively. By how much does the population of the whole town fall short of a million?

SIMPLE MULTIPLICATION.

(1) Multiply 1210803 by 76.

(2) Multiply 1956800 by 7300.

(3) Multiply 780456 by 8005.

(4) Find the product of 926196 and 7896.

(5) Find the product of 30034007 and 837856.

(6) Multiply 500050041 by $54\frac{5}{8}$.

(7) Multiply 87648107 by $16\frac{2}{11}$.

(8) Find the product of 87648107 and $79\frac{4}{7}$.

(9) The multiplicand is 92860294, and the multiplier is 144. What is the product?

(10) How much will 837856 amount to when repeated 999 times?

(11) Multiply the difference between 310342 and 2774 by 540900.

(12) The sum of two numbers is 17264, and the greater number is 9999. What is the product?

(13) Find the continued product of 87, 901, 367.

(14) 6565 × 6786 × 9898.

(15) Find the product of four hundred and sixty-nine thousand eight hundred and thirty and three hundred and sixty-nine.

(16) Multiply fourteen thousand two hundred and thirty-one by thirteen thousand two hundred and twelve.

(17) If a merchant begins business with £20000, and retired after seventeen years' trading, in which he made £560 each year for the first six years, and £759 a year afterwards. What did he retire with?

(18) Two trains start from the same place at the same time in *opposite directions*, the one travelling at the rate of 35 miles an hour, and the other at 25 miles an hour. How far will they be apart in $6\frac{1}{2}$ hours? If they travel in the *same* direction, what will be the distance between them in the same time?

SIMPLE DIVISION.

(1) Divide 6432079432 by 9.

(2) Divide 365438511 by 81 (split up into factors).

(3) Divide 730146292 by 54 (split up into factors).

(4) Find the quotient of 1554584788 and 2197.

(5) The dividend is 64875237 and the divisor is 158. Find the quotient.

(6) Divide 16108 by $7\frac{1}{2}$.

(7) Divide 87654 by $12\frac{3}{8}$.

(8) Divide 50413 by $8\frac{2}{3}$.

(9) The dividend is 6784054678 and the divisor is $121\frac{3}{4}$. What is the quotient?

(10) What will be the value of $\frac{8}{9}$ of 921306?

(11) What will $\frac{11}{12}$ of 31670021 come to?

(12) What is the 85th part of 678513592?

(13) How often is 123 contained in 876543?

(14) The dividend is four hundred and nineteen millions three hundred and twenty thousand and four; the divisor is six hundred and twenty-seven thousand and fourteen. Find the quotient.

(15) By what number must you multiply 98 in order to produce 9267566 ?

(16) Find the quotient when the divisor is three hundred and twenty-one and the dividend one million eight hundred and fifteen thousand four hundred and eighty-three.

(17) The interest of the National Debt is £22,792,594. How many poor families would this support for the year, supposing that each family consisted of father, mother, and 3 children, allowing for each parent £8 for the year, and £4 for each child ?

(18) There is a large cistern holding 10,000 gallons which is filled by 2 pipes, through one of which runs 9 gallons per minute, and through the other 8 gallons per minute. Unfortunately the cistern has been damaged so that there is a waste of one gallon per minute. How many minutes will the cistern take in filling ?

MISCELLANEOUS QUESTIONS IN THE SIMPLE RULES.

(1) Find the sum, difference, product, and quotient of 88832 and 256.

(2) What is the difference between twelve times sixty-nine, and twelve times nine and sixty ?

(3) What number multiplied by 19 will give 1843 ?

(4) What number added to thirty thousand and fifty-nine will make one million and a quarter ?

(5) Divide 11 × 7 × 9 by 3 × 4 × 6.

(6) What is the difference between the 12th part of 20100 and the 5th part of 9110 ?

(7) What number multiplied by 365 will give the product 315725 ?

(8) What number multiplied by 95 will give the same product as 157 and 570?

(9) What number is that from which if a twelfth part of 1728 be subtracted and the remainder be increased by the 95th part of 82175, the sum will be 1185?

(10) The sum of two numbers is 6784, and the difference between them 62. Find their product.

(11) What number divided by 1185 will give 497 for the quotient and leave just a fifth part of the divisor remaining?

(12) A certain number divided by 243 gives quotient 1306 and remainder 92. Find the number.

REDUCTION.

Reduce—

(1) £67 5*s*. $9\frac{5}{7}$*d*. to sevenths of a penny.
(2) £297 14*s*. $11\frac{3}{4}$*d*., $\frac{1}{9}$ to ninths of a farthing.
(3) 37 half guineas to farthings.
(4) 758 crowns to pence.
(5) 37 cwt. 2 qrs. 7 lbs. 5 oz. to drs.
(6) 3 mls. 5 fur. 30 poles 3 yds. to feet.
(7) 37 Eng. ells 2 qrs. 1 nl. to nails.
(8) 3 yds. 3 qrs. 3 nls. $1\frac{1}{4}$ inches to inches.
(9) 37 ac. 3 roods 25 poles 26 sq. yds. to sq. yds.
(10) 6759271 fifths of a penny to £.
(11) 6753017 eighths of a farthing to crowns.
(12) 1950067 farthings to half-crowns.
(13) 321756 farthings to moidores (27 shillings).
(14) 9712005 oz. to cwt.
(15) 11495 sq. yds. to acres, roods, poles.
(16) 6001567 hf.-crowns to 4*d*. pieces.
(17) In 359012 guineas how many sixpences?
(18) In 852346 fourpences, how many 3*d*. pieces?
(19) In £5271 how many guineas?

(20) Bring 327 guineas to pounds.

(21) How many Eng. ells are there in 327 yds. 2 qrs ?

(22) How many yds. are there in 395 French ells 1 qr. ?

(23) How many Flemish ells in 917 yds. 2 qrs. ?

(24) Bring £36 5*s.* 7¼*d.*; 1*s.* 9*d.*; 7½ guineas; 3*s.* 2*d.*, all to the same name.

(25) Find how many miles there are in a road which is one million inches long. (Give answer in miles, furlongs, poles, &c.)

(26) A person has copper coins to the value of £102 12*s.* 6*d.*; find their weight, if 3 penny-pieces weigh an ounce Avoirdupois.

(27) How many lbs. Troy are equal to 4320 lbs. Avoirdupois ?

(28) How many grains Troy are there in a mass of metal weighing 1 cwt. 1 qr. 2 lbs. 11$\frac{3}{7}$ oz. ?

(29) One cubic ft. of water weighs 1000 oz. What will be the weight (in cwt. qrs. lbs. oz.) of the water in a cistern holding 100 cubic feet ?

(30) Show that there are the same number of farthings in £59 12*s.* 1¾*d.* as there are pounds in 25 tons 10 cwt. 3 qrs. 19 lbs.

(31) A debt of £3 17*s.* 6*d.* is paid in farthings: how many will be required, and what will be their weight if 8 farthings weigh one ounce ?

COMPOUND ADDITION.

Add together—

	£	*s.*	*d.*
(1)	14	11	3¼
	19	18	10
	77	11	3¼
	49	14	7
	16	18	4½
	17	15	10
	1	14	9¼
	6	18	10¾

	lbs.	oz.	dwts.
(2)	71	11	19
	64	8	14
	77	0	0
	14	3	11
	64	2	9
	74	1	14
	77	2	13
	19	2	14

	miles	fur.	poles	yds.	ft.	in.
(3)	46	2	18	3	1	6
	20	6	19	5	2	9
	50	4	17	4	1	6
	37	7	30	3	2	10
	37	5	12	4	2	9

(4) Find the sum of 375 yds. 2 qrs. 3 nls. 1½ in.; 412 yds. 3 qrs. 1 nl. 2 in.; 397 yds. 1 qr. 3 nls. 2 in.; 265 yds. 2 qrs. 3 nls. 1¼ in.; 879 yds. 3 qrs. 3 nls. 1½ in.; 3 qrs. 3 nls. 1 in.; 2 qrs. 0 nl. 2 in.

(5) 412 roods 35 poles 27 yds. + 395 roods 37 poles 15 yds. + 275 roods 16 poles 9 yds. + 199 roods 27 poles 25 yds. + 854 roods 29 poles 27 yds. + 457 roods 17 poles 18 yds.

(6) Add together £219 11*s.* 9½*d.*; 97 half-sovereigns; £25 19*s.* 11¾*d.*; 27¾ guineas, and 154 florins.

(7) What will the following amount to? £15, 15 guineas, 15 hf.-sovereigns, 15 hf.-crowns, 15 florins, 15 pence, and 15 farthings.

(8) Add together (giving the answer in yds. qrs. nls.) 37 Eng. ells 3 qrs. 2 nls., 5 Eng. ells 0 qr. 1 nl., 40 yds. 2 qrs. 2 nls., 37 Fr. ells 1 qr. 3 nls., 40 Fl. ells 0 qr. 3 nls.

(9) In furnishing a house a person expends £96 10*s.* 3¼*d.* on one room, £78 19*s.* 11¾*d.* on another, £56 7*s.* 8½*d.* on a third, £35 7*s.* 9¾*d.* on a fourth, £109 8*s.* 3¼*d.* on five others, and £268 12*s.* 10¾*d.* for plate and other articles. What did the whole cost him?

(10) The collection for a certain cause was made up of the following sums: One £20 note, seven £5 notes, 117 sovereigns, 279 half-sovereigns, 487 half-crowns, 137 florins, 697 shilling pieces, 315 sixpences, 49 fourpenny pieces, 79 threepenny pieces, and 1157 penny pieces. What was collected in all?

(11) I pay my accounts half-yearly and I owe my butcher £29 5*s.* 11¾*d.*, grocer £20 16*s.* 11¾*d.*, baker £12 7*s.* 10¼*d.*, bookseller £7 19*s.* 7¾*d.*, and have other expenses amounting to £16 15*s.* 7¾*d.* What sum ought I to draw from the bank in order to pay all these accounts, and also the half-yearly rental of my house, which is rented at £60 per annum?

(12) Received from a merchant abroad a quantity of cotton worth £597 4*s.* 7½*d.* The shipping charges amount

to £35 7*s.* 11¼*d.*, I intend to keep it on hand for some time and shall have to pay for warehousing it £15 9*s.* 9*d.* How must I sell it to gain 20 guineas by the transaction ?

COMPOUND SUBTRACTION.

	£	s.	
(1)	1260	5	10
	679	19	3½

	£	s.	d.
(2)	109	19	9¼
	21	11	11½

	miles	fur.	poles	yds.
(3)	1670	5	28	3
	209	6	32	4½

	lbs.	oz.	dwts.	grs.
(4)	108	7	10	12
	79	10	7	20

(5) 116 oz. 18 dwts. 20 grs. — 87 oz. 19 dwts. 23 grs.

(6) 37 perches 30 sq. yds. 8 sq. ft. 90 sq. in. — 30 sq. yds. 8 sq. ft. 140 sq. in.

(7) By how much does 1 mile 1706 yds. 3 ft. 3 in. exceed 1758 yds. 2 ft. 11 in. ?

(8) Find the difference between 83 guineas 19*s.* 9¾*d.* and 81 guineas 19*s.* 10¾*d.*

(9) Find the difference between 8 qrs. 3 pks. 1 gal. 1 qt. 1 pt. and 7 qrs. 1 bush. 3 pks. 1 gal. 2 qts.

(10) Take £999 19*s.* 11¾*d.* from £1001.

(11) From 500 half-guineas subtract 500 half-crowns.

(12) Find the difference between (£5 6*s.* 7½*d.* + £1 10*s.* 11¾*d.*) and (£3 7*s.* 9¼*d.* + 20 crowns).

(13) I have to receive £3 17*s.* 9¼*d.* from *A* ; £6 19*s.* 11*d.* from *B* ; and £20 13*s.* 7¼*d.* from *C* ; and I have to pay my bookseller £31 11*s.* 3½*d.* Shall I be able to do so ?

(14) A merchant ordered 757 Eng. ells 2 qrs. 2 nls. of cloth, but receives instead 709 Fl. ells. What quantity (in yards) will he still have to receive ?

(15) Subtract 2 roods 32 poles 12 sq. yds. 6 sq. ft. 10 sq. in. from 2 acres.

(16) What sum will be left when the amounts £5 10*s*. 7½*d*., £12 18*s*. 6¾*d*., £9 4*s*. 6¼*d*. and £3 2*s*. 4½*d*. of four bills have been paid out of £35 ?

(17) What sum added to £19 19*s*. 9¾*d*. will make 31½ guineas ?

(18) Four persons possess a field containing four acres and a half. *A*'s portion is 3½ roods, *B*'s 35 perches 28 sq. yds., whilst *C* has as much as 1 acre 2 roods 15 sq. yds. How much of the field does *D* possess ?

COMPOUND MULTIPLICATION.

(1) £897 13*s*. 3¾*d*. × 9. (2) 4 cwt. 3 qrs. 21 lbs. × 12.

(3) 23 miles 3 fur. 17 poles 2 yds. × 11.

(4) Multiply £109 15*s*. 4¼*d*. by 15 (split up into factors).

(5) 459 lbs. 11 oz. 15 dwts. 23 grs. × 77 (using factors).

(6) £397 2*s*. 11¾*d*. × 679.

(7) 47 miles 3 fur. 30 poles 3 yds. × 198.

(8) 5 cwt. 2 qrs. 17 lbs. 5 oz. × 2311.

(9) £15 16*s*. 4¼*d*. × 3⅕. (10) £127 13*s*. 4*d*. × 208 2/9.

(11) 3 lbs. 5 oz. 6 dwts. 7 grs. × 45 5/7.

(12) A farmer buys 137 oxen, for which he gives £9 11*s*. 7½*d*. each. What will he have to pay in all?

(13) A person buys 19 railway shares, for which he gives £67 10*s*. 6*d*. each, but returning home he meets with a friend who offers him £68 2*s*. 9*d*. for each share, which he accepts. What will be his profit by this transaction ?

(14) A landed proprietor wishes to apportion to 37 poor people of his parish small allotments, each consisting of 1 rood 10 poles 5 sq. yds. What sized field must he use for that purpose ?

(15) A tradesman purchases 300 penknives at 5*s*. 9½*d*. per doz., which he can sell retail at 1*s*. each. What does he hope to gain by this purchase ?

(16) A person's expenses of living during the present year have increased £1 17*s.* 9¾*d.* per week, and also his business has fallen off so much that he makes weekly 9*s.* 7*d.* less than he previously did. What will be his loss compared with the last year?

(17) A family have put by £50 for a 4 weeks' excursion to the sea-side. They pay £5 2*s.* 7*d.* for railway fares, and they engage lodgings at 3 guineas per week, and they calculate that their expenses will be 15*s.* 7½*d.* daily. With what money will they return home?

(18) A merchant lives away from his office, and makes a point of always walking there and back every working day of the week. After measurement he finds that the distance between his house and place of business is 2 miles 1 fur. 5 poles 2 yds. How far will he have walked in the year on that road?

COMPOUND DIVISION.

(1) Divide £149 6*s.* 10½*d.* by 6.
(2) Divide 46 cwt. 1 qr. 22 lbs. by 6.
(3) Divide 491 acres 1 rood by 25 (split up into factors).
(4) 373 oz. 8 dwts. 3 grs. ÷ 35 (split up into factors).
(5) 1251 fur. 137 yds. 1 ft. ÷ 208.
(6) £22535 8*s.* 11½*d.* ÷ 391.
(7) 313 miles 5 fur. 8 poles 4 yds. 2 ft. 3 in. ÷ 872.
(8) 178 lbs. 9 oz. 19 dwts. 23 grs. ÷ 154.
(9) £333 6*s.* 8*d.* ÷ 3⅓.
(10) 107 tons 17 cwt. 2 qrs. ÷ 46⅔.
(11) 39 acres 1 rood 33 poles ÷ 11⅚.
(12) £5248 15*s.* 6*d.* ÷ £93 14*s.* 6¾*d.*
(13) 859 yds. 0 qr. 2 nls. ÷ 9 yds. 3 qrs. 2 nls.
(14) How often is 5 Eng. ells. 4 qrs. 1 nl. contained in 754 Eng. ells 3 qrs. 1 nl.?

(15) Divide 160 ac. 1 ro. 37 po. into fields of 17 ac. 3 ro. 13 po.

(16) How many times does £71 14*s.* 10*d.* go into £394 11*s.* 7*d.* ?

(17) What is the 45th part of 681 yds. 3 qrs. 2 nls. ?

(18) How many times is 195 yds. 1 ft. 8 in. contained in a mile.

(19) Divide 18 miles 3 fur. 23 po. 1½ yds. into 35 equal distances.

(20) In distributing a charity of £16 4*s.* 6*d.* amongst the poor of a village, the overseer who was paid 10*s.* for his trouble, divided the recipients into four equal classes, giving the first 10*s.* each, the second 5*s.* each, the third 2*s.* 6*d.* each, and the last 1*s.* each. How many people in all were relieved ?

(21) I intend to plant the road leading to my house, which is 75 yds. long, with trees planted on both sides, at the distance of 2 ft. 6 in. from each other. How many trees shall I require ?

(22) The glazier desires to know how many panes of glass, each containing 24 sq. in., he must order for a house with 33 windows in it, each measuring 4 sq. yds.

(23) After paying half of a bill of £117 10*s.* in crowns, I pay £28 10*s.* in half-sovereigns, one fifth of the remainder in shillings, and the rest in fourpenny pieces. How many coins of each kind are used ?

(24) A gentleman's income in 1861 was £685, out of which he saved £274 7*s.* 6*d.* What was his average daily expenditure ?

(25) A railway train which travels at the uniform rate of 66 ft. per second, leaves London at 9 o'clock A. M. When will it reach Edinburgh, the distance from London to Edinburgh being 405 miles ?

(26) If 40 shillings weigh 7 oz. 5 dwts. and contain 10 dwts. 21 grs. of alloy, how much pure silver is there in one shilling ?

(27) The business of a company produces £24299 14*s*. 5*d*.: of this amount £14487 16*s*. 11*d*. goes for working expenses; the remainder is divided amongst 100 shareholders. How much does each get?

(28) 4 thalers, 12 dollars, 10 florins, and 3 guineas amount to £7 2*s*. If the value of a dollar is 4*s*. 2*d*., what is the value of a thaler?

BILLS OF PARCELS.

(1) A lady buys at a draper's shop 18½ yds. of silk at 7*s*. 6*d*. per yd., 21 yds. of calico at 11¼*d*. per yd., 2 doz. pairs of gloves at 2*s*. 9*d*. per pair, and 10 yds. of ribbon at 1*s*. 10*d*. per yd. What was the amount of the bill?

(2) Make out the bill for 10 lbs. of sugar at 5*d*. per lb., 6 lbs. of tea at 3*s*. 8*d*. per lb., 8 lbs. of coffee at 1*s*. 4*d*. per lb., 12 lbs. of currants at 5¾*d*. per lb., 10 lbs. of rice at 4½*d*. per lb., 9 lbs. of cheese at 11*d*. per lb.

(3) Make out a bill for the following articles: 15 yds. of damask for curtains at 4*s*. 9*d*. per yd., 28 yds. of gimp at 10½*d*. per yd., 24 rings at 4*s*. 3*d*. per doz., 24 hooks at 1¾*d*. per doz., and workwoman's time 2½ days at 2*s*. 3*d*. a day.

SIMPLE PROPORTION.

(1) If 9 acres 1 rood 32 poles of pasture suffice for 25 sheep, how much will suffice for 480 sheep?

(2) If 18 gallons of beer cost £1 1*s*., what is the cost of 11 pints?

(3) How much coffee at 1*s*. 10½*d*. per lb. must be given in exchange for 78 lbs. of tea at 5*s*. 1½*d*. per lb.?

(4) A bankrupt's estate pays 4*s*. 4½*d*. in the £; what loss will be sustained by a creditor whose claim is for £432 12*s*.

(5) If 1000 sovereigns weigh 21 lbs. 5 oz. 16 dwt., what weight of gold will be contained in 192 sovereigns?

(6) If 53 chests of tea, each weighing 3 qrs. 19 lbs. cost £749 12*s.* 3*d.*, what is the cost of 17 lbs.?

(7) How many yards of cloth worth 18*s.* 3*d.* per yd. ought to be given in exchange for 24 Eng. ells of cloth worth 13*s.* 8¼*d.* per ell?

(8) How much will a poor rate of 2*s.* 8*d.* in the £ produce in a parish where the whole property is rated at £4736 5*s.*?

(9) Of a new company two thousand five hundred and sixty £20 shares are taken; what must be the call per share to raise immediately £8967?

(10) *A*'s annual income is £550, of which £330 is paid at Lady-day, and £220 at Michaelmas. He pays income tax on the £330 at the rate of 5*d.* in the £. At what rate per £ must he pay on the remaining £220 that he may pay 9*d.* in the £ on his whole income?

(11) A grocer gave £25 for 8 cwt. 1 qr. 9 lbs. of sugar, and lost £4 by retailing it. At what rate did he sell it per lb.?

(12) If an income of £300 pay £11 5*s.* for income tax; how much will be paid for an income of £525 10*s.*

(13) The poor's rate being 3*s.* 4*d.* in the pound; what is the rateable value of a property which pays annually a rate of £416 13*s.* 4*d.*?

(14) If 10 men and 15 boys can reap a field in 6 days; in how many days will 7 men and 12 boys reap it, supposing that 2 men can do as much as 3 boys?

(15) A tourist just before leaving London has £23 12*s.*6*d.*, and on his arrival at Paris he exchanges what remains for 23 Nap. 12 fr. 50 cents. If 1 Nap. = 20 francs and 1 franc = 100 centimes, find what he had already spent, the rate of exchange being 25 fr. 20 cents. per £ sterling.

(16) Express 32 Spanish piastres in French money,

exchange being at the rate of 25 francs per £1 sterling and £3 7*s.* 6*d.* for 20 piastres.

(17) A person buys 7 cwt. 3 qrs. 12 lbs. of sugar for £13 15*s.* How must he sell it per lb. that he may gain $\frac{1}{2}$*d.* on each pound?

(18) A train starts from London for a place 200 miles off at the rate of 25 miles per hour. After 3 hours a special train is despatched with the express object of overtaking it at a station 10 miles from the place of destination: at what speed should this special train travel?

(19) A merchant engages a clerk on March 1, at the salary of £250 per annum, but being dissatisfied with him he dismisses him on August 3. What will he have to pay him for his services?

COMPOUND PROPORTION.

(1) The produce of a field of wheat yielding 4 qrs. per acre is worth £148 when wheat is at £3 per qr.; what will the produce of the same field be worth when the yield is 5 qrs. per acre and wheat is at 50*s.* per quarter?

(2) If 12 furnaces consume 12 tons 9 cwt. 21 lbs. of coal in 10 hours; how long will 7 furnaces be in consuming 15 tons?

(3) If a man walk 600 miles in 25 days walking 8 hours a day; in how many days will he walk 330 miles walking 10 hours a day?

(4) If 8 men can build 2 roods of a wall, one brick thick, in 3 days; how many men must be employed to build 5 roods, a brick and a half thick, in 6 days?

(5) If 7 bush. 2 pks. be consumed by 10 horses in 7 days; how many horses will consume 3 quarters 6 bushels at the same rate in 10 days?

(6) If £20 in trade gain £16 in 15 months; what sum will gain £24 in 3 months at the same rate?

(7) If £9 16*s.* be the wages of 14 men for 7 days, what at the same rate will be the wages of 20 men for 4 days?

(8) The rental of a parish is £1850 and the rates are taken on 80 per cent. of the rental. What is the amount of a rate at 9*d.* in the £?

(9) If 44 labourers can do a piece of work in 15 days of 10 hours each; how many navvies must be employed to do three-fourths more work in 7 days of 11 hours each, supposing that 3 navvies can do the work of 5 labourers?

(10) If the wages of 54 men for 36 days amount to £60 15*s.* What will be the wages of 30 men and 50 boys for 32 days, supposing 2 men to do as much work as 5 boys?

(11) If the interest on £125 for 3 years be £13 2*s.* 6*d.*; what will be the interest on £200 for 5 years at the same rate?

(12) If it costs sixteen guineas to supply 30 men, 48 women, and 60 boys with bread for a week, supposing a man to eat twice as much as a boy, and a woman to eat one-fourth less than a man; how much will it cost to supply 25 men, 60 women, and 72 boys for 10 days?

(13) If 5 men can reap 33 acres in 5 days, working 11 hours a day; how many days would it take 4 men to mow 32 acres, working 10 hours a day, if they can mow 5 acres in the same time that they can reap 4 acres?

(14) If 2 horses be worth as much as 5 oxen and 3 oxen as much as 16 sheep; what will be the value of a horse if the price of a sheep is £3 15*s.*?

(15) If a certain MS. fill 6 printed sheets, each containing 32 pages and each page 24 lines with 9 words in each line; how many lines of 12 words each must there be in a page in order that another similar MS. twice as long may fill 3 sheets each containing 48 pages?

PRACTICE.

Find the value of—

(1) 9650 lbs. at $7\frac{1}{2}$*d.* each.
(2) 4567 lbs. at $11\frac{1}{4}$*d.* each.
(3) 8765 lbs. at $11\frac{1}{6}$*d.* per lb.
(4) 792 lbs. at $5\frac{1}{4}$*d.* per lb.
(5) 8246 at $\frac{3}{4}$*d.* each.
(6) 5472 at $11\frac{5}{8}$*d.* each.
(7) 3212 yds. at 1*s.* $3\frac{1}{2}$*d.* per yd.
(8) $6258\frac{1}{4}$ yds. at 2*s.* $7\frac{1}{4}$*d.* per yd.
(9) 427 lbs. at 3*s.* 9*d.* per lb.
(10) 2011 yds. at 7*s.* $9\frac{1}{2}$*d.* per yd.
(11) $316\frac{3}{4}$ lbs. at 13*s.* $1\frac{1}{4}$*d.* per lb.
(12) 4159 yds. at 17*s.* 9*d.* per yd.
(13) $297\frac{1}{4}$ yds. at 15*s.* $9\frac{1}{2}$*d.* per yd.
(14) $101\frac{3}{8}$ at 17*s.* 10*d.*
(15) $117\frac{5}{8}$ yds. at 6*s.* 9*d.* per yd.
(16) $914\frac{7}{8}$ at £1 2*s.* 7*d.* each.
(17) $548\frac{3}{8}$ at 19*s.* 6*d.*
(18) 2397 at £10 15*s.* 10*d.*
(19) $937\frac{1}{2}$ at £3 17*s.* 8*d.*
(20) $379\frac{1}{4}$ at £2 18*s.* 7*d.*
(21) $78209\frac{7}{10}$ at £3 16*s.* $9\frac{3}{4}$*d.*
(22) 4685 at £6 9*s.* 4*d.*
(23) 48144 at 13*s.* $9\frac{1}{4}$*d.*
(24) 2 cwt. 3 qrs. 12 lbs. at £1 7*s.* 6*d.* per cwt.
(25) 2 ac. 3 roods 16 poles at £24 13*s.* $4\frac{1}{2}$*d.* per rood.
(26) 8 cwt. 0 qr. 4 lbs. at £2 7*s.* 8*d.* per cwt.
(27) 2 cwt. 2 qrs. 6 lbs. at £2 11*s.* 7*d.* per cwt.
(28) 97 cwt. 2 qrs. 16 lbs. at £6 6*s.* 8*d.* per cwt.
(29) 79 ac. 2 roods 10 poles at £3 11*s.* 6*d.* per acre.
(30) 1 qr. 2 bushels 2 pks. at £29 16*s.* 6*d.* per bushel.
(31) 54 cub. ft. 1200 cub. inches at 3*s.* $7\frac{1}{4}$*d.* per cub. ft.

(32) Find the cost of 3 ac. 2 roods 10 poles 5 sq. yds at £67 10*s.* 6*d.* per acre.

(33) Find the cost of 3 ac. 3 roods 25 perches at £120 per acre.

(34) Find by practice the cost of making a road 9 miles 5 fur. 44 yds. long at £25 8*s*. 4*d*. per mile.

(35) Find the value of 97 yds. 1 qr. 1 nl. at 17*s*. 9½*d*. per yard.

(36) Find the value of 3 tons 5 cwt. 1 qr. 17 lbs. of iron at 1⅛*d*. per lb.

(37) A miller buys from a corn factor 956 qrs. 7 bush. 3 pks. at £3 11*s*. 3*d*. per quarter. What will be the amount due?

(38) Find the value of a bar of gold weighing 6 lbs. 8 oz. 12 dwts. 12 grs. at £4 4*s*. 6*d*. per oz.

(39) A merchant bought a cask of sugar at the rate of £1 8*s*. 2*d*. per cwt. The cask with the sugar in it weighs 9 cwt. 3 qrs. 23 lbs. but when empty weighs 1 qr. 9 lbs. What will be the cost of the sugar?

(40) The produce of an acre is 4 qrs. 3 bush. 2 pks. of wheat; what quantity will be obtained from a field containing 7 acres 1 rood 25 poles?

(41) A person can walk 3 miles 1 fur. 30 perches 3 yds. 1 ft. 6 in. in an hour. Find (by practice) how far he will have gone in 6 hours 12 minutes.

(42) A grocer buys 300 lbs. of tea at 2*s*. 4½*d*. per lb., but 60 lbs. of it being damaged, the price for this is reduced to 1*s*. 9*d*. per lb. What is the cost of the whole?

(43) A gentleman buys a farm containg 167 ac. 3 roods 5¼ perches, of which 87 ac. 1 rood 2 perches are arable land, the rest being pasture land. For the arable land he agrees to pay £67 13*s*. 6*d*. per acre, but for the other 5 guineas an acre more. What will be the amount of purchase money?

(44) Find by practice the wages of 3 masons who work for 3 weeks 4 days and 2 hours at £2 per week each; reckoning 5½ days to the week, and 8 hours to the day.

(45) A bankrupt owes a creditor £1125 12*s*. 6*d*., but he

can only pay 5*s.* 7½*d.* in the £. Find by practice what the creditor will receive.

(46) Make out the bill for 5½ dozen lbs. of candles at 8½ per lb., 8¼ lbs. of wax ditto at 2*s.* 3*d.* per lb., 7 gal. 2½ pints of oil at 4*s.* 8*d.* per gallon, and 2 lamps at 13*s.* 9*d.* each.

SIMPLE INTEREST.

Find the simple interest and the amount of—

(1) £397 10*s.* for 1 year at 4½ per cent.
(2) £436 13*s.* for 1 year at 2¾ per cent.
(3) £612 10*s.* for 6 years at 3½ per cent.
(4) £451 17*s.* 6*d.* for 4 years at 2¼ per cent.

(5) What will be the interest on £98 19*s.* 6*d.* for 11 months at 3¾ per cent.?

(6) What will be the interest on £364 17*s.* 5*d.* for 5 months at 3¼ per cent.?

(7) What will be the interest on £850 for 3 years 3 months at 4½ per cent.?

(8) What will be the interest of £797 13*s.* 6*d.* for 66 days at 2½ per cent.?

(9) What will be the interest of £780 for 257 days at 3¾ per cent.?

(10) What will be the interest on £260 which I borrowed May 7, and paid back on September 12, supposing that money is worth 4 per cent.?

(11) £450 was borrowed on June 1, 1868, at 5 per cent. per annum; what sum will repay the debt on October 20 of the same year?

(12) I borrowed from a person on May 1 the sum of £750, of which I pay back £250 on July 1, and again £300 on October 1; I finally pay off the remainder on December 1, together with interest at 3 per cent. What shall I have to pay as the balance?

(13) Wishing to extend my business, my banker has accordingly advanced me £570 on March 10, £300 on June 11, and again £250 on October 1, on condition that I pay off the whole with legal interest on December 31. What sum of money shall I have to send into the bank?

(14) What principal put out to interest for 4 years at 4½ per cent. will amount to £722 15*s.*?

(15) What sum of money will amount to £323 2*s.* 6*d.* in 6½ years at 4½ per cent. simple interest?

(16) What sum put out to interest for 18 months at 5 per cent. will amount to £188 2*s.* 6*d.*?

(17) What principal lent for 3½ years at 4¼ per cent. will give £48 9*s.* 4¼*d.* for interest?

(18) At what rate per cent. will £1125 amount to £1260 in 4 years?

(19) What will money be worth per cent. when the interest of £556 13*s.* 4*d.* for 6 years is £167?

(20) In what time will £1050 produce £210 interest, when money is at 4 per cent.?

(21) For how long must I lend £2833 6*s.* 8*d.*, when money is worth 3 per cent., that I may receive £3215 16*s.* 8*d.* instead of the money actually lent?

(22) A person puts out at interest £1250 at 4½ per cent.; what amount of income does he derive from it?

(23) At 2½ per cent. per annum, what sum of money must be invested to give an annual income of £80?

(24) If I buy land, and pay for it a sum equal to twenty-eight times the annual rent, what rate of interest per annum shall I get for my money?

(25) A gentleman purchases an estate of 350 acres at £79 per acre. He wishes to get 3 per cent. interest for his money; what should be the annual rental?

(26) A large mansion, the rental of which is 150 guineas per annum, is offered for sale. What sum of money ought a person to pay for it that he may receive £8 per cent. per annum on his outlay?

(27) The newspapers state that at a recent sale of property in Leeds, some houses, which let for £40 17*s.* per annum, were sold for £3310. What rate per cent. per annum will the purchaser receive for his money?

(28) I desire to leave my faithful servant an annuity of £65, and money is now at 2½ per cent.; how much money must I invest for that object?

(29) A dealer buys goods for £1050, and sells after 6 months for £867; how much did he lose, considering money to be worth 8 per cent. per annum?

COMPOUND INTEREST.

Find the compound interest and amount of—

(1) £420 10*s.* for 3 years at 4 per cent.

(2) £360 for 2 years at 5 per cent. (interest payable half yearly).

(3) Find the difference between the simple and compound interest of £3600 in 2½ years, at 3¾ per cent. per annum.

(4) How much will £725 amount to in 4 years at 5 per cent. compound interest?

(5) Find the amount of £1200 at the end of 4 years, reckoning compound interest at 5 per cent. per annum.

(6) Find the simple and compound interest of £112 10*s.* for 3 years, at 3⅓ per cent. per annum.

BANKERS' OR MERCANTILE DISCOUNT, ETC.

(1) Find the bankers' discount and reputed present worth of £670 10*s.*, due 3 months hence, at 4 per cent.

(2) I take to a bank a bill of £350 which is due in 63

days; how much will the banker retain for discounting the bill, and what shall I receive—discount being at the rate of 2½ per cent.?

(3) Find the common discount on a bill of £250 10*s.* which is dated January 1 at 3 months, and is taken to the bank on February 10—discount being at the rate of 3½ per cent.?

(4) £400. *London, May* 26, 1868.

Three months after date I promise to pay to Mr. William Smith, or order, four hundred pounds for value received. WILLIAM BROWN.

This promissory note is taken to the bank July 1. What will the banker retain for discount, and what will he give in cash—money being worth 4 per cent.?

(5) £360. *London, June* 1, 1868.

Three months after date pay to me, or order, three hundred and sixty pounds for value received.

James Brown.

To Mr. James Brown. WILLIAM JONES.

How much will the owner of this bill receive if he takes it to the bank July 17, and receives cash for it—money being worth 2½ per cent.?

(6) I have a bill in my possession of £600, which is due in 6 months. If I get it cashed now the bankers will charge me 5 per cent.; but if I wait for three months I shall be able to get it discounted at 3½ per cent. On all money that I have in my business I am able to make 6 per cent. per annum profit; would it be prudent in me to cash the bill at once, or wait till I can get it done at the lower rate? If so, how much should I gain or lose?

TRUE DISCOUNT, ETC.

(1) What is the correct present worth of £1680, due 4 years hence, at 4½ per cent. per annum?

(2) What is the present value of £450 10*s.* 6*d.*, due at the end of 2½ years, at 4½ per cent.?

(3) How much money is equivalent to receiving £150 at the end of 4 months at 3 per cent.?

(4) What sum now will be the same as £360 due in 63 days at 2½ per cent.?

(5) Find the true discount on £5135 for 219 days at 4½ per cent. per annum? What will be the difference between that and the bankers' discount?

(6) Find the true discount on £793 14*s.* 10½*d.* due at 9 months. What discount would, in fact, be allowed—discount being 4 per cent.? Give also the banker's gain.

(7) Find the correct present worth of a bill of £450, dated June 4, 1868, at 3 months, and which is discounted on August 4 at 3 per cent.?

(8) £876. *Birmingham, August* 1, 1868.

Three months after date I promise to pay to Mr. Smith, or order, eight hundred and seventy-six pounds for value received. JOHN WILSON.

What money will the banker deduct for cashing it on September 30, and what ought he to charge, money being worth 5 per cent.?

(9) A bookseller sells 3,000 copies of a book at 41 shillings each, and takes in exchange a bill at 6 months for the amount. How much would he gain or lose by selling them instead for cash at 39 shillings each, interest being at 5 per cent. per annum?

(10) The rental of my house is £60 per annum, and I have to pay my rent half-yearly. What sum of money

paid in advance would be an equivalent to the yearly rental, money being worth 3 per cent. per annum?

(11) If the true discount on £678 8*s*., which is due at the end of a year and a half, be £38 8*s*., what is the rate per cent. per annum, reckoning simple interest?

(12) Some property is to be sold on the condition that half the purchase money is paid at once, and the remainder in 3 months' time. I purchase it for £6,600, but am desirous to pay the whole at once. What shall I have to pay, money being then at 3½ per cent. per annum?

VULGAR FRACTIONS.

I. THE GREATEST COMMON MEASURE.

Find the G. C. M. of—

(1) 2187 and 8019. (2) 677 and 8801.
(3) 59 and 5959. (4) 1521, 1755, and 2691.
(5) 27, 81, 729.

(6) What is the greatest number that will divide 945 and 1323 without remainder?

(7) Find the greatest number that is contained exactly in 539, 693, 847.

II. THE LEAST COMMON MULTIPLE.

Find the L. C. M. of—

(1) 4, 6, 12, 18. (2) 6, 8, 9, 10, 12.
(3) 12, 16, 18, 24, 36. (4) 10, 12, 14, 36, 42.
(5) 13, 26, 28, 39, 51, 117. (6) 7, 11, 21, 33, 42, 55.

(7) Find the least sum of money that can be paid with an exact number of guineas, crowns, and florins.

III. REDUCTION OF AN INTEGER OR MIXED NUMBER TO AN IMPROPER FRACTION.

Reduce to improper fractions—

(1) $61\frac{5}{9}$. (2) $111\frac{1}{19}$. (3) $101\frac{1}{77}$.
(4) 9. (5) $37\frac{1}{76}$. (6) $99\frac{1}{99}$.

(7) How many 12ths of a pound are there in £$67\frac{11}{12}$?

(8) I have $11\frac{1}{12}$ cakes to distribute, giving each person $\frac{1}{12}$th of a cake. How many persons will receive some ?

IV. REDUCTION OF IMPROPER FRACTIONS TO INTEGERS OR MIXED NUMBERS.

Reduce to integers or mixed numbers—

(1) $\frac{1000}{9}$. (2) $\frac{368}{8}$. (3) $\frac{97015}{375}$.
(4) $\frac{200016}{999}$. (5) $\frac{69111}{67}$. (6) $\frac{100100}{101}$.

(7) If I distribute the third part of a stone of flour to all the poor persons in a village, who number 38, what quantity of flour shall I have to order ?

V. REDUCTION OF FRACTIONS TO THE LOWEST TERMS OR TO THE SIMPLEST FORM.

Reduce to lowest terms—

(1) $\frac{501}{1837}$. (2) $\frac{2108}{3813}$. (3) $\frac{64961}{68419}$.
(4) $\frac{7410}{9790}$. (5) $\frac{14455}{14896}$.

(6) Express in simplest form $\frac{24389}{26071}$.

(7) Simplify $\frac{1892}{1936}$.

VI. REDUCTION OF COMPOUND FRACTIONS TO SIMPLE FRACTIONS.

Express as simple fractions—

(1) $\frac{4}{5}$ of $3\frac{1}{2}$ of $4\frac{1}{4}$. (2) $\frac{5}{8}$ of $\frac{8}{11}$ of $\frac{11}{12}$ of $\frac{12}{13}$.
(3) $3\frac{1}{3}$ of $4\frac{1}{4}$ of $5\frac{1}{5}$ of $\frac{1}{26}$.

(4) What simple fraction is equivalent to $\frac{2}{7}$ of $5\frac{4}{9}$ of $\frac{1}{4}$ of $5\frac{3}{5}$?

(5) Simplify $2\frac{3}{4}$ of $4\frac{4}{7}$ of $6\frac{1}{3}$ of $\frac{1}{19}$.

(6) Reduce to simplest form $\frac{9}{10}$ of $3\frac{1}{3}$ of $5\frac{2}{7}$ of $\frac{1}{37}$.

VII. MULTIPLICATION AND DIVISION OF CONCRETE QUANTITIES.

(1) £3 5*s.* $7\frac{1}{7}$*d.* × 9. (2) £4 19*s.* $9\frac{2}{5}$*d.* × 11.
(3) £2 17*s.* $5\frac{1}{3}$*d.* × 12. (4) 3 cwt. 1 qr. $27\frac{2}{5}$ lbs. × 9.
(5) 3 oz. 5 dwts. $4\frac{3}{5}$ grains × 7.
(6) 3 miles 5 fur. $35\frac{1}{7}$ poles × 35.
(7) 5 cub. ft. $1101\frac{3}{11}$ cub. in. × 49.
(8) £69 0*s.* $1\frac{1}{9}$*d.* ÷ 11. (9) £321 17*s.* $3\frac{4}{5}$*d.* ÷ 25.
(10) £200 14*s.* $5\frac{1}{10}$*d.* ÷ 64.
(11) 47 miles 3 fur. $25\frac{2}{3}$ poles ÷ 35.
(12) 360 oz. 10 dwts. $17\frac{1}{11}$ grs. ÷ 49.
(13) 6 cub. yds. 20 cub. ft. $11\frac{6}{7}$ cub. in. ÷ 72.

VIII. REDUCTION OF FRACTIONS TO THE LEAST COMMON DENOMINATOR, AND ALSO THE COMPARING OF FRACTIONS.

Reduce to the least common denominator—

(1) $\frac{2}{3}$, $\frac{3}{4}$, $\frac{5}{6}$, $\frac{7}{8}$, $\frac{9}{10}$. (2) $2\frac{2}{3}$ of $\frac{1}{4}$, $3\frac{1}{5}$ of $\frac{1}{4}$, $\frac{2}{3}$, $3\frac{1}{9}$.
(3) $4\frac{1}{4}$, $2\frac{2}{3}$, $3\frac{1}{9}$, $\frac{1}{6}$. (4) $\frac{1}{2}$ of $\frac{4}{5}$ of $\frac{1}{8}$, $3\frac{1}{3}$, $\frac{1}{9}$, $2\frac{4}{5}$.
(5) $\frac{6}{7}$, $\frac{8}{9}$, $\frac{9}{10}$, $\frac{11}{12}$, $\frac{3}{4}$. (6) $3\frac{1}{3}$, $4\frac{1}{4}$, $5\frac{1}{5}$, $6\frac{1}{6}$, $7\frac{1}{7}$, $8\frac{1}{8}$.
(7) Show that $\frac{3}{4}$ and $\frac{15}{20}$ are equal in value.
(8) Compare the fractions $\frac{5}{7}$ and $\frac{3}{5}$.
(9) Which is the greater fraction, $\frac{3}{5}$ or $\frac{4}{7}$?
(10) Which is the greater, $\frac{2}{7}$ of a loaf or $\frac{3}{11}$ of it?
(11) Write down the fractions $\frac{3}{5}$, $\frac{5}{8}$, $\frac{13}{16}$ according to their magnitude.

(12) Compare values of $\frac{3}{4}$, $\frac{4}{5}$, and $\frac{3+4}{4+5}$.

IX. ADDITION OF FRACTIONS.

Add together—

(1) $\frac{2}{3}$ of $\frac{1}{7}$ of $8\frac{3}{4}$ and $\frac{1}{4}$ of $\frac{2}{5}$. (2) $\frac{3}{7}+\frac{5}{8}+\frac{17}{10}+4\frac{5}{6}$.

(3) $\frac{7}{16}+\frac{2}{3}+\frac{5}{48}+3\frac{19}{24}$. (4) $2\frac{3}{7}$, $5\frac{1}{4}$, $\frac{8}{21}$, $1\frac{5}{12}$.

(5) $\frac{3}{7}$, $\frac{5}{8}$, $\frac{23}{14}$, and $4\frac{1}{4}$.

(6) 10, $7\frac{4}{9}$, $\frac{5}{27}$, $4\frac{2}{3}$, and $3\frac{1}{3}$ of $\frac{1}{9}$.

(7) Find the sum of $3\frac{1}{3}$, $4\frac{1}{4}$, $5\frac{1}{5}$, $6\frac{1}{6}$, and $12\frac{1}{12}$.

(8) Find the value of $\frac{2}{3}+\frac{3}{4}+\frac{4}{5}+\frac{7}{8}+\frac{9}{10}+3$.

(9) What is the sum of $100\frac{1}{9}$, $3\frac{1}{3}$, $56\frac{4}{9}$, $3\frac{5}{27}$?

	£	s.	d.		dwts.	grs.		mls.	fur.	pls.
(10)	67	3	$5\frac{2}{7}$	(11)	3	$9\frac{2}{5}$	(12)	3	2	$3\frac{1}{3}$
	41	6	$7\frac{5}{9}$		2	$16\frac{7}{11}$		1	3	$20\frac{3}{4}$
	33	3	$9\frac{3}{4}$		9	$1\frac{2}{3}$		2	1	$7\frac{5}{6}$
	4	1	$7\frac{2}{3}$		3	$7\frac{4}{15}$		3	3	$21\frac{7}{8}$
	3	3	$11\frac{1}{4}$		6	$3\frac{4}{11}$		1	7	$20\frac{1}{9}$

X. SUBTRACTION OF FRACTIONS.

(1) Subtract $4\frac{9}{11}$ from $8\frac{4}{5}$. (2) Subtract $9\frac{7}{10}$ from $10\frac{7}{9}$.

(3) Subtract $10\frac{7}{8}$ from $23\frac{1}{2}$. (4) Take $6\frac{5}{8}$ from $20\frac{1}{4}$.

(5) Subtract $5\frac{2}{3}$ from $14\frac{3}{7}$.

(6) How much less is $12\frac{2}{9}$ than 14?

(7) Find the difference between $\frac{9}{10}$ of $\frac{21}{50}$ and $\frac{9}{10}$ of $\frac{1}{50}$.

(8) What must be added to $\frac{1}{3}$ of $\frac{4}{9}$ of $\frac{3}{5}$ that the result may be $\frac{1}{6}$?

(9) How much greater is $\frac{1}{3}$ of $7\frac{1}{2}$ than $\frac{29}{30}$ of $1\frac{1}{4}$?

(10) Reduce to simplest form $11\frac{2}{3}-\frac{6}{8}+\frac{4}{5}-\frac{20}{24}-\frac{2}{5}-\frac{1}{2}$.

(11) Add together $\frac{3}{4}$, $\frac{6}{7}$, and $\frac{7}{12}$, and subtract $\frac{6}{7}-\frac{8}{11}$ from the sum obtained.

(12) £3 1*s.* $9\frac{1}{3}$*d.* (13) £9 17*s.* $5\frac{6}{7}$*d.*—£4 18*s.* $6\frac{15}{16}$*d.*
£2 11*s.* $10\frac{6}{7}$*d.*

(14) Take £1 2*s.* $7\frac{2}{9}$*d.* from £5 0*s.* $0\frac{1}{5}$*d.*

(15) What number must be taken from $3\frac{1}{3}$ so as to leave $1\frac{7}{8}$?

XI. MULTIPLICATION OF FRACTIONS.

(1) Multiply $14\frac{1}{6}$ by $7\frac{1}{17}$.

(2) Multiply $\frac{3}{4}$ of $1\frac{5}{11}$ by $\frac{2}{7}$ of $8\frac{7}{9}$.

(3) Multiply $132\frac{4}{5}$ by $3\frac{1}{8}$.

(4) Find value of $10\frac{2}{7} \times 2\frac{11}{12}$.

(5) Multiply $\frac{7}{20}$ of $\frac{13}{16}$ of $\frac{15}{17}$ by $\frac{51}{77}$ of $\frac{99}{100}$ of $\frac{256}{585}$.

(6) Find value of $2\frac{4}{5}$ of $\frac{9}{7}$ of $3\frac{3}{4} \times 6\frac{1}{7}$ of $\frac{7}{9}$.

(7) $(\frac{3}{4}-\frac{1}{2}) \times (\frac{5}{7}+\frac{2}{3})$. (8) $(3\frac{1}{4}+2\frac{2}{3}) \times (2\frac{6}{7}-1\frac{1}{3})$.

(9) What number divided by $2\frac{3}{4}$ will give $6\frac{1}{2}$?

(10) A box measures $2\frac{3}{4}$ ft. in length, $1\frac{7}{8}$ ft. in breadth, ($\frac{3}{4}$ of $1\frac{1}{4}$) ft. in depth. Find the solid content.

(11) A room measures $12\frac{7}{8}$ ft. in length, $13\frac{9}{13}$ ft. in breadth, and the height is $11\frac{7}{9}$ ft. How many square feet are there in the walls? and how many in the floor?

XII. DIVISION OF FRACTIONS.

(1) Divide $5\frac{3}{4}$ by $15\frac{1}{3}$. (2) Divide $27\frac{13}{15}$ by $3\frac{4}{5}$.

(3) Divide $14\frac{4}{9}$ by $11\frac{2}{3}$. (4) $200 \div \frac{5}{7}$ of $5\frac{4}{9}$.

(5) Divide $\frac{4}{7}$ of $9\frac{4}{5}$ by seven times one-fifth of 30.

(6) $5\frac{2}{3}$ of $\frac{1}{15} \div (6\frac{1}{5}-\frac{2}{25})$.

(7) Divide $(4\frac{1}{5}+\frac{6}{7})$ by $(\frac{3}{4}-\frac{1}{7})$.

(8) What fraction will $5\frac{1}{7}$ be of $2\frac{6}{7}$?

(9) Divide the difference between $\frac{3}{4}$ and $\frac{1}{3}$ by the sum of $6\frac{1}{7}$ and $\frac{2}{3}$.

(10) Divide $(\frac{6}{7}+\frac{2}{3}$ of $\frac{3}{4}$ of $\frac{4}{5})$ by $(\frac{9}{5}-\frac{6}{7})$.

(11) Add together $\frac{3}{4}$, $\frac{13}{16}$, $\frac{13}{32}$, $\frac{7}{480}$, and divide the sum by the difference of $\frac{11}{24}$ and $\frac{7}{40}$.

(12) Find the value of $\frac{6}{7}$ of £3 6*s.* $9\frac{1}{3}$*d.*

(13) Find value of $\frac{5}{11}$ of 3 cwt. 2 qrs. $17\frac{1}{7}$ lbs.

Reduce to simplest form—

(14) $\dfrac{6\frac{7}{9}}{3\frac{8}{9}}$. (15) $\dfrac{9\frac{1}{3}}{4\frac{2}{3}}$. (16) $\dfrac{\frac{11}{12}}{7\frac{1}{3}}$.

(17) $\dfrac{3\frac{1}{2}+4\frac{1}{3}}{5\frac{1}{7}-2\frac{1}{3}}$. (18) $\dfrac{3\frac{1}{3} \text{ of } \frac{3}{10}}{4\frac{2}{3}+\frac{6}{7}}$.

XIII. SIMPLIFICATION OF FRACTIONS.

(1) Simplify $\dfrac{2\frac{1}{2}+3\frac{1}{3}-4\frac{1}{4}}{5\frac{1}{5}+7\frac{1}{12}}$. (2) Simplify $4\frac{2}{9}\times 6\frac{3}{7}\div\dfrac{2\frac{1}{2}}{7}$.

(3) Reduce to simplest form $\dfrac{4\frac{1}{7}-2\frac{1}{4}}{6\frac{1}{2}+2\frac{1}{7}}\div\dfrac{\frac{3}{7}+\frac{1}{2}}{\frac{5}{7}-\frac{1}{2}}$.

(4) Simplify $\dfrac{\frac{1}{7}-\frac{1}{9}(\frac{1}{2}+\frac{1}{7})}{1+\dfrac{1}{2-\frac{1}{4}}}$.

(5) Simplify $\dfrac{3}{8-\dfrac{7}{2-\frac{3}{4}}}+\dfrac{5}{6-\dfrac{5}{2-\frac{5}{6}}}$.

(6) Reduce to simplest form $\dfrac{\frac{1}{9}\text{ of }1\frac{1}{4}\text{ of }4\frac{1}{2}}{\frac{5}{56}\text{ of }1\frac{1}{3}\text{ of }3\frac{1}{2}}-\dfrac{3\frac{1}{4}+4\frac{1}{3}}{6\frac{1}{2}+1\frac{1}{12}}$.

(7) Reduce to simplest form $\frac{1}{4}$ of $\frac{7}{8}$ of $\left(\dfrac{2\frac{1}{3}}{3\frac{1}{2}}+\dfrac{4\frac{1}{2}}{5\frac{1}{4}}\right)$.

(8) Simplify

$$\left(\frac{2}{7}\times\frac{1-\frac{2}{7}}{2}\right)+\left(\frac{4}{5}\times\frac{1}{10}\right)+\frac{3}{5}\left(\frac{1}{2}+\frac{11}{14}\right)+\frac{3}{7}\left(\frac{2}{7}+\frac{4}{5}\right).$$

(9) Simplify

$$\left\{\frac{18}{17}\left(1-\frac{64}{81}\right)\right\}+\left\{\frac{8}{11}\times\frac{1}{6}\times\left(\frac{1}{2}+\frac{5}{12}\right)\right\}+\frac{1\frac{1}{2}\text{ of }9\frac{1}{3}}{2\frac{3}{4}\text{ of }7\frac{7}{11}}.$$

(10) Reduce to simplest form $7\frac{3}{4}+\frac{5}{7}$ of $\dfrac{4\frac{2}{3}}{2\frac{1}{2}}-\left(13\times\dfrac{7}{65}\right)$.

(11) Find simplest form of expression for

$$\frac{1\frac{4}{17}\times 6\frac{4}{5}}{3\frac{3}{5}-1\frac{2}{25}}+\frac{2}{11}\text{ of }\left(2\frac{2}{3}-\frac{3}{4}\right)-\frac{1\frac{3}{5}}{12}.$$

(12) Express in simplest form $3\frac{1}{3}\div\left\{\dfrac{1-\frac{15}{16}}{\frac{1}{5}-\frac{1}{8}}\right\}$.

(13) Simplify $5\frac{2}{3}$ of $\frac{1}{15}\div(6\frac{1}{5}-\frac{2}{25})$.

(14) Simplify $\dfrac{3\frac{1}{4}-2\frac{1}{3}}{3\frac{1}{6}+1\frac{1}{2}}\div 1\frac{4}{7}$.

XIV. VALUE OF FRACTIONS.

Find the value of—

(1) $\frac{3}{4}$ of a guinea. (2) $\frac{3}{5}$ of 5*s*. 7*d*.

(3) $\frac{5}{16}$ of a cwt. (4) $\frac{3}{17}$ of a mile.

Find the value of—

(5) $\frac{8}{9}$ of 1*s.* $7\frac{1}{2}$*d.*

(6) £$3\frac{5}{8}$.

(7) $3\frac{6}{7}$ of £8 0*s.* $7\frac{1}{7}$*d.*

(8) $2\frac{3}{8}$ guineas.

(9) $1\frac{1}{5}$ of $3\frac{1}{2}$ of $5\frac{1}{3}$ of $3\frac{1}{2}$ yds. (cloth measure).

(10) $\frac{5}{7}$ of $\frac{7}{15}$ of 3 acres 30 poles.

(11) £3 6*s.* $7\frac{1}{9}$*d.* $\times 6\frac{2}{7}$.

(12) 4*s.* $7\frac{2}{7}$*d.* $\times$ ($3\frac{1}{2}$ of $\frac{4}{7}$).

(13) 9 cwt. 1 qr. $15\frac{4}{9}$ lbs. $\times 2\frac{2}{3}$.

(14) £1 11*s.* $7\frac{3}{5}$*d.* $\times \dfrac{3\frac{1}{2}}{2\frac{2}{3}}$.

(15) 2 qrs. $17\frac{5}{11}$ lbs. $\div 3\frac{1}{3}$.

(16) 19 cwt. 0 qr. $23\frac{5}{9}$ lbs. $\div 2\frac{2}{7}$.

(17) $\frac{7}{16}$ of £5 + $\frac{2}{7}$ of £9 13*s.* $2\frac{3}{4}$*d.* + $\frac{5}{12}$ of 2*s.* 6*d.*

(18) Find amount of land in $\frac{4}{5}$ acre + $\frac{1}{36}$ rood + $\frac{8}{9}$ pole.

(19) From $2\frac{3}{4}$ of 11*s.* 8*d.* take $1\frac{1}{2}$ of 17*s.* $2\frac{1}{2}$*d.*

(20) Find the difference between $\frac{3}{11}$ of £78 16*s.* $2\frac{1}{2}$*d.* and £35 14*s.* $8\frac{1}{4}$*d.* $\div 1\frac{2}{3}$.

(21) Find value of $\frac{3}{16}$ of a florin + $\frac{3}{5}$ of half a crown − $\frac{1}{16}$ of 5*s.* + $\frac{3}{4}$ of a £.

(22) Find difference between $\frac{5}{6}$ of 14*s.* $10\frac{1}{2}$*d.* and $\frac{6}{7}$ of the same sum.

(23) What is the value of $2\frac{3}{5}$ of £$3\frac{3}{4}$ divided by $3\frac{3}{8}$?

XV. REDUCTION OF FRACTIONS.

Reduce—

(1) $\frac{1}{5}$ of a farthing to the fraction of half a guinea.

(2) £$\frac{3}{4}$ to the fraction of a guinea.

(3) $\frac{147}{160}$ guinea to the fraction of a £.

(4) $\frac{3}{5}$ yard to the fraction of an English ell.

(5) $\frac{1}{16}$ square pole to the fraction of a square yard.

(6) Express $\frac{3}{4}$ square yard in the denomination of a square pole.

(7) Express $3\frac{2}{3}$ yards in the denomination of a mile.

Reduce—

(8) $\frac{4}{7}$ lb. Avoirdupois to the fraction of a lb. Troy.

(9) $\frac{5}{7}$ of half guinea to the fraction of a £.

(10) $\frac{12}{13}$ of an inch to the fraction of 1 yard (cloth measure).

Reduce—

(11) $\frac{3}{7}$ square yard to the fraction of 1 acre.
(12) $\frac{1}{7}$ of a farthing to the fraction of £3.
(13) $\frac{4}{9}$ of a penny to the fraction of £2 5*s.*
(14) $\frac{6}{7}$ of a sixpence to the fraction of £3 7*s.* 6*d.*
(15) 1 ft. $7\frac{7}{8}$ in. to the fraction of 1 pole.
(16) 2 qrs. $1\frac{1}{7}$ nail to the fraction of $3\frac{1}{5}$ English ells.
(17) $5\frac{1}{2}$ gallons to the fraction of $1\frac{3}{8}$ pks.
(18) 7 oz. to the fraction of 2 cwt.
(19) 17 yds. 1 ft. $7\frac{1}{2}$ in. to the fraction of $\frac{1}{2}$ mile.
(20) 2 ft. 3 in. to the fraction of $4\frac{1}{2}$ yards.
(21) 3 acres 1 rood 20 poles to the fraction of 21 acres.
(22) 4 oz. 7 dwts. 12 grs. to the fraction of 5 oz. Troy.
(23) What fraction of $9\frac{1}{4}$ guineas is $\frac{7}{16}$ of £9 17*s.* 4*d.* ?
(24) Reduce $\frac{1}{9}$ of 2*s.* $7\frac{1}{2}$*d.* to the fraction of 1 guinea.
(25) What vulgar fraction of 3 square poles are 2 square poles 22 yards ?
(26) Reduce $\frac{5}{9}$ of 19*s.* $7\frac{1}{7}$*d.* to the fraction of £2 16*s.* 7*d.*
(27) Reduce 3 cwt. 1 qr. $17\frac{1}{9}$ lbs. to the fraction of 3 cwt. 2 qrs. $19\frac{1}{3}$ lbs.
(28) What fraction of $9\frac{1}{4}$ guineas is $\frac{7}{16}$ of a £ ?

XVI. MISCELLANEOUS QUESTIONS ON VULGAR FRACTIONS AND PROPORTION.

(1) Add together $1\frac{1}{3}$, $\frac{8}{3}$ of $\frac{41}{34}$, $\frac{4}{5\frac{1}{10}}$.

(2) Add together $\frac{7}{12}$, $2\frac{1}{6}$, $\frac{5\frac{1}{2}}{4\frac{3}{5}}$.

(3) A boy after giving away $\frac{1}{4}$ of his pocket money to one companion and $\frac{7}{8}$ of the remainder to another, has 8*d.* left. How much had he at first ?

(4) From $2\frac{3}{4}$ of 11*s.* 8*d.* take $1\frac{1}{2}$ of 17*s.* $2\frac{1}{2}$*d.*, and reduce the remainder to the fraction of 13*s.* $5\frac{1}{4}$*d.*

(5) Multiply together $3\frac{5}{9}$, $1\frac{7}{8}$ of $\frac{1\frac{1}{2}}{5}$, and $\frac{13}{14}$.

(6) Add together $\frac{3}{8}+6$, $\frac{63}{128}$ of $\frac{1}{3}$ of $2\frac{2}{3}$, $\frac{1}{6\frac{6}{7}}\div\frac{7}{8}$ and $\frac{27}{81}$.

(7) In a subscription list, one-half of the subscriptions are a guinea each, one-third a half-guinea each, and the 5*s.* subscriptions complete the list, and amount to £12. Find the amount of subscriptions.

(8) *A* can earn £1 in 3 days, *A* and *B* together earn £9 in 12 days, and *B* and *C* together earn £35 10*s.* in 42 days. Compare the rates of wages of *A*, *B*, and *C*.

(9) If £3 10*s.* are the wages of 4 men for $6\frac{1}{2}$ days, what are the wages of 17 men for 4 weeks of $5\frac{1}{3}$ days in each week?

(10) In $3\frac{3}{5}$ hours a train travels $87\frac{39}{40}$ miles. What is its rate per hour?

(11) If $2\frac{3}{4}-1\frac{5}{8}$ of an estate cost £440, what will $2\frac{1}{2}$ of $\frac{5}{12}$ of it cost?

(12) If 8 horses plough $11\frac{2}{3}$ acres in 2 days, in how many days will 6 horses plough $17\frac{1}{2}$ acres?

(13) It is found that 1296 bricks (the exposed surface of each brick measuring $9\frac{1}{2}$ in. by $4\frac{1}{2}$ in.) have been employed in paving a certain courtyard. How many tiles 6 in. square would be required for a pavement one-ninth of the size?

(14) How often does $\frac{6}{55}$ of $\frac{3}{20}$ of $\frac{77}{72}$ of £1 contain $\frac{4}{15}$ of $\frac{3}{40}$ of $\frac{100}{7}$ of half a guinea?

(15) Make out a bill of the following articles: $\frac{5}{16}$ of a yard at £2 per yard, $\frac{13}{15}$ of a yard at 2*s.* 6*d.* per yard, $38\frac{16}{17}$ at £7 15*s.* $8\frac{3}{4}$*d.* per yard, and $2\frac{1}{4}$ yards at £1 12*s.* 8*d.* per yard.

DECIMAL FRACTIONS.

I. EXPRESS AS DECIMAL FRACTIONS

(1) $\frac{1}{8}$. (2) $\frac{7}{10000}$. (3) $3\frac{3}{4}$. (4) $67\frac{1}{1000}$.

(5) $37\frac{7}{50}$. (6) $\frac{1}{2}$ of $5\frac{1}{2}$. (7) $\dfrac{333\frac{1}{3}}{100000}$ (8) $\frac{5}{6}$ of $7\frac{1}{2}$.

(9) $\frac{1}{6250}$. (10) $\frac{29}{88}$. (11) $\frac{3657}{100}$.

(12) Express as decimals 7-ten thousandths.

(13) 3-thousandths. (14) 107-tenths

II. EXPRESS AS VULGAR FRACTIONS

(1) $\cdot 5$ (2) $\cdot 05$ (3) $\cdot 0875$ (4) $\cdot 2625$
(5) $3\cdot 075$ (6) $\cdot 000625$ (7) $\cdot 0012$ (8) $7\cdot 005$
(9) $37\cdot 00025$ (10) $\cdot 01\dot{5}$ (11) $\cdot 011\dot{3}\dot{6}$ (12) $\cdot 02\dot{2}\dot{7}$
(13) $\cdot 602\dot{2}\dot{7}$ (14) $1\cdot 0\dot{1}$ (15) $17\cdot 30\dot{5}$ (16) $\cdot 33\frac{1}{3}$
(17) $\cdot 11\frac{1}{9}$

III. ADDITION OF DECIMALS.

(1) Add together $3\cdot 507$, $\cdot 0036$, $418\cdot 8$ and 96.
(2) Add together $17\cdot 493$, $2\cdot 574$, 125, and $\cdot 004270$.
(3) Add together $15\cdot 0102$, $\cdot 004$, 20, and $\cdot 86280$.
(4) Find the sum of $16\cdot 044$, $1\cdot 44$, $1\cdot 4$, $\cdot 7$ and 7601.
(5) What number is that from which if $3\cdot 007$ be taken there will be left $1\cdot 993$.
(6) Add together $\cdot 2$, $\cdot 002$, $\frac{3}{4}$, $\frac{5}{8}$, $\frac{1}{1000}$ and 3.
(7) Add together $\cdot\dot{3}$, $\cdot 1\dot{6}$, 3, 16, $\cdot 4\dot{6}$.
(8) Find the sum of $\cdot\dot{0}4\dot{5}+\cdot 8\dot{4}\dot{2}+\cdot\dot{0}\dot{3}+\cdot\dot{7}+7$.
(9) Add together as decimals $\frac{3}{10}$, $\frac{7}{10000}$, $\frac{12}{1000000}$.

IV. SUBTRACTION OF DECIMALS.

(1) Subtract $37\cdot 589$ from $86\cdot 1$.
(2) Subtract $5\cdot 64723$ from $129\cdot 068$.
(3) Subtract $46\cdot 2517$ from 50.
(4) Subtract $6\cdot 0498$ from $14\cdot 2$.
(5) Subtract $\cdot\dot{7}2\dot{9}$ from $\cdot\dot{9}7\dot{2}$.
(6) Subtract $\cdot\dot{3}\dot{1}$ from $\cdot\dot{4}\dot{5}$.
(7) $1-\cdot 9995$. (8) $7-\cdot 2005$. (9) $\cdot\dot{3}-\cdot\dot{0}\dot{3}$.
(10) Add together $\cdot 00125$, $14\cdot 473$, 12500, $\cdot 0032$ and subtract the sum from $13784\cdot 64$.
(11) Add together 265-millionths, 98-ten-thousandths, 46-hundredths, and subtract the sum from the sum of 7-tenths and 4-hundred-thousandths.
(12) Find the value of $3\cdot 005-4\cdot 1+67\cdot 0001-37+\cdot 0275-4\cdot 4$.

V. MULTIPLICATION OF DECIMALS.

(1) ·02057 × ·0039 (2) ·47 × ·00432
(3) 57·013 × ·00029 (4) 34·203 × ·0123
(5) 1·08 × ·007 (6) ·008 × ·0016
(7) ·0125 × 20·08 (8) 7·64 × ·032
(9) ·003625 × 74·2 (10) 35·85 × 2·09
(11) 3·585 × ·00209 (12) ·003125 × ·48
(13) 1·00025 × 2400 (14) 100 × ·000001
(15) ·1 × ·1 (16) 1 × ·1
(17) ·1 × ·0001 (18) ·01 × 10

(19) Find the continued product of ·1 × ·1 × 100 × ·0001 × 10000.

(20) $\cdot\dot{1}\dot{8} \times \cdot\dot{0}\dot{5}$ (21) $19\cdot30\dot{5} \times \cdot\dot{2}$

(22) Find value of $7\cdot\dot{6} \times 5\cdot\dot{3}$.

VI. DIVISION OF DECIMALS.

(1) ·144 ÷ 1200 (2) 4·8 ÷ ·0016
(3) 384·006 ÷ ·123 (4) ·5 ÷ 25
(5) 87·5 ÷ 2·5 (6) ·055757592 ÷ ·009207
(7) 72·5026 ÷ 7·85 (8) 145·0052 ÷ ·00785
(9) 3075 ÷ ·125 (10) 23·065 ÷ 3·5
(11) 23·065 ÷ ·0035 (12) 30·5118 ÷ 50·6
(13) 56·763 ÷ ·0021 (14) 36 ÷ ·012
(15) ·36 ÷ 120 (16) 3·6 ÷ 1·2
(17) 84·375 ÷ ·00375 (18) 6·82 ÷ ·0125
(19) 3·12 ÷ 325 (20) 312 ÷ ·0325
(21) 28·9 ÷ 17 (22) 289 ÷ ·17
(23) ·289 ÷ ·017 (24) ·00307326 ÷ 3·013
(25) ·008 ÷ ·0016 (26) 21·97 ÷ 1·69
(27) ·3090 ÷ 750 (28) ·000072072 ÷ ·000012
(29) $27\cdot36 \div 3\cdot1\dot{0}\dot{9}$ (30) $3\cdot\dot{6} \div 2\cdot5$
(31) $37\cdot\dot{3} \div 6\cdot1\dot{6}$ (32) $6\cdot\dot{7} \div 2\cdot\dot{6}$

(33) Multiply 2·1825 by ·0046 and divide the result by ·0002425.

(34) Find the value of $\cdot 15\dot{9}\dot{0} \times \cdot 47\dot{2} \div 2\cdot\dot{7}$.

(35) Assuming that a cubic mètre contains 1000 litres and that a mètre contains 39·4 inches, find the number of cubic inches in a litre.

(36) The seconds pendulum being 1·0872 yards long, express its length in French mètres to 4 places of decimals (1 mètre=39·3708 inches).

(37) If a cubic foot of gold may be made to cover uniformly and perfectly 432,000,000 sq. inches, find the thickness of coating of gold.

VII. TO FIND THE VALUE OF ANY DECIMAL OF A GIVEN QUANTITY.

Find the value of—

(1) ·675 of £1.
(2) 37·625 of £1.
(3) 6·25 of half a crown.
(4) $\cdot\dot{7}$ of 5 shillings.
(5) $\cdot\dot{4}\dot{5}$ of 3 guineas.
(6) ·125 of 6*s*. 7½*d*.
(7) 3·005 of £3 2*s*. 6*d*.
(8) $2\cdot\dot{3}$ of a mile.
(9) ·6875 of 3*s*. 4*d*.
(10) ·8125 of a cwt.
(11) ·00625 of £50.
(12) ·72645 of £1 14*s*. 6*d*.
(13) $\cdot 4\dot{5}$ of £11 14*s*. 4½*d*.
(14) ·02083 of £67 4*s*.

(15) Add together £15·125, 17·3125 shillings, 9·75 pence.

(16) Find the value of ·0375 of a £ + $5\cdot\dot{0}\dot{9}$ of 2*s*. 9*d*.

(17) Find the difference between £$\cdot 41\dot{6}$ + $\cdot 8\dot{3}$ shillings and £·416 + ·83 shillings.

(18) Add together ·0625 of 2*s*. 8*d*., $\cdot\dot{2}$ of 2*s*. 7½*d*., and ·8375 of £1.

(19) Compare values of $\cdot\dot{7}$ of a guinea, $\cdot\dot{8}\dot{1}$ of £1 and ·9816 of 16*s*. 8*d*.

VIII. TO REDUCE A GIVEN QUANTITY TO THE DECIMAL OF ANOTHER GIVEN QUANTITY.

Reduce—

(1) £4 17*s*. 3½*d*. to the decimal of 1 guinea.

(2) £1 14*s*. 9¾*d*. to the decimal of 2 guineas.

Reduce—

(3) £5 7*s.* 3½*d.* to the decimal of £1.

(4) £6 6*s.* 8*d.* to the decimal of 13*s.* 4*d.*

(5) 9 ac. 2 roods 4$\frac{39}{80}$ poles to the decimal of 22 ac. 0 rood 26 poles.

(6) 2*d.* to the decimal of £1.

(7) 1·725 of 5*s.* 6*d.* to the decimal of 2*s.* 6*d.*

(8) 6*s.* 6¾*d.* to the decimal of half a guinea.

(9) 2*s.* 2½*d.* to the decimal of 1*s.* 8*d.*

(10) ¾ of £5 19*s.* to the decimal of £3 12*s.* 11*d.*

(11) 2 ft. 3 in. to the decimal of 4½ yards.

(12) $\frac{12}{25}$ of £20 to the decimal of £100.

(13) 5 fur. 97 yds. 2 ft. 3 in. to the decimal of a mile.

(14) What decimal of £1 is 8·4 of a penny?

(15) What decimal part of £1 must be added to $\cdot\dot{0}\dot{9}$ of £6 13*s.* 4½*d.* that the result may be 15 shillings?

(16) Reduce $\frac{2}{9}$ of 4 oz. 19 dwts. to the decimal of 2⅔ of 16 dwts. 21 gr.

(17) What decimal of £1 is $\frac{3}{7}$ of 3$\frac{1}{9}$ of 4*s.* 11*d.*?

(18) Express $\cdot 2\dot{6}\dot{3}$ of £1 7*s.* 6*d.* as decimal of £20.

DUODECIMALS, AREAS, AND VOLUMES.

Find the area of surfaces of the following dimensions—

(1) 7 ft. 6′ × 6 ft. 7′.
(2) 9 ft. 2′ 9″ × 9 ft. 7′ 11″.
(3) 13 ft. 7′ 9″ × 12 ft. 9′ 10″.
(4) 39 ft. 7′ 9″ × 24 ft. 2′ 9″.
(5) 64 ft. 6′ 10″ × 21 ft. 11′ 3″.
(6) 3 yds. 2 ft. 3′ 3″ × 6 ft. 7′ 10″.
(7) 37 ft. 8′ 10″ × 3¾ in.
(8) 17 ft. 10½ in. × 5½ in.
(9) 11 ft. 4′ 4″ × 3 ft. 3′ 5″.

Find the cubic contents of solids of the following dimensions—

(10) 9 ft. 6′ × 7 ft. 8′ × 6 ft. 7′.

(11) 11 ft. 3′ 4″ × 6 ft. 7′ 5″ × 5 ft. 4′ 6″.

(12) 12 ft. 4′ 6″ × 8 ft. 6′ 8″ × 4 ft. 6′ 6″.

(13) 8 ft. 7′ 10″ × 5 ft. 9′ 11″ × 6 ft. 3′ 4″.

(14) What will be the expense of paving an area which measures 35 ft. 10 in. by 18 ft. 6 in. at 6*s.* 3*d.* per yd. ?

(15) Find the value of a balk of timber 39 ft. 6 in. long, and 3 ft. 7 in. thick each way, at 2*s.* 6*d.* a cub. ft.

(16) How many tiles each 7 in. square will be required to cover a floor 19 ft. 3 in. by 13 ft. 5 in. ?

(17) A tank is 30 ft. 9 in. long, 16 ft. 7 in. wide, and 6 ft. 4 in. deep. Find how much water it will hold in cubic feet and inches.

(18) Find the expense of lining the sides and bottom of a rectangular cistern 12 ft. 9 in. long, 8 ft. 3 in. broad, 6 ft. 6 in. deep, with lead which costs £1 8*s.* per cwt. and weighs 8 lbs. to the sq. ft.

(19) What is the area of a flat roof 17 ft. 4 in. long and 13 ft. 4 in. wide ? and what will be the expense of covering it with sheet lead one-sixteenth of an inch thick, supposing that a cubic inch of lead weighs 6¼ oz. avoirdupois, and that a lb. cost 3½*d.* ?

(20) Prove that a square room whose side is 17 ft. 6 in. long, will require 43 yds. 2 ft. 3 in. of carpet 2 ft. 4 in. wide. Find its value at 3*s.* 9*d.* per yd.

(21) What length of wall-paper 27 in. broad, will be required for a room 18 ft. long, 12 ft. broad, and 11 ft. high ?

(22) If a box with a lid is made of planking 1½ in. thick, if the external dimensions are 3 ft. 6 in., 2 ft. 6 in., and 1 feet 9 in., find how many sq. ft. of planking were used in the construction.

(23) If a cubic foot of marble weigh 2·716 times as much as a cubic foot of water, find the weight of a block of

marble 9 ft. 6 in. long, 2 ft. 3 in. broad, and 2 ft. thick, supposing a cubic foot of water to weigh 1000 oz.

(24) An upholsterer covers a floor 21 ft. 8 in. by 16 ft. 6 in. with carpet 27 in. wide. Find the cost of the carpet at 3*s.* 4½*d.* per yd. in length.

(25) Find the cost of carpeting a room 18 ft. 9 in. long and 17 ft. 6 in. broad with carpet 2 ft. wide at 4*s.* 9*d.* per yd.

(26) What is the rent at £1 13*s.* per acre of a rectangular field of which the length is 1 fur. 20 poles, and the breadth 10 poles 1 yd.?

SQUARE ROOT.

Find the square root of—

(1) 47089. (2) 207936. (3) 574560900.
(4) 49674304. (5) 22530·01.
(6) 258·16561 to 3 places of decimals. (7) ·00003136.

Find the value of the following quantities to 3 places of decimals if necessary.

(8) $\sqrt{\cdot 001}$. (9) $\sqrt{\cdot 000001}$. (10) $\sqrt{11\cdot}$.
(11) $\overline{48\cdot 025}$.

Find the value of the following to 4 places of decimals if necessary.

(12) $\sqrt{\frac{9}{16}}$. (13) $\sqrt{4\frac{1}{5}}$. (14) $\sqrt{\frac{225}{361}}$.
(15) $\sqrt{\frac{3}{4}}$. (16) $\sqrt{\frac{1}{2} \text{ of } 5\frac{1}{2}}$. (17) $\sqrt{18\frac{1}{16}}$.

(18) If the area of a square field is 824464 sq. yds. find the length of its side.

(19) Find the length of the side of a square field containing 27 acres 12 poles 1 yd.

(20) A square field contains 3 acres 1 rood 4 poles 25 yds. Find the length of each side.

(21) What number multiplied by itself will give 70207641?

(22) What must be the length of the side of a square field that shall contain five times the number of sq. yds. that there are in a rectangular field which measures 210 yds. in length and 450 ft. in breadth?

CUBE ROOT.

Find the cube root of—

(1) 373248. (2) 27270901. (3) 1141166·125.
(4) ·9.

Find the value of—

(5) $\sqrt[3]{\cdot000008}$. (6) $\sqrt[3]{\frac{125}{729}}$. (7) $\sqrt[3]{30}$.
(8) $\sqrt[3]{2\cdot5}$. (9) $\sqrt[3]{3\frac{3}{8}}$. (10) $\sqrt[3]{\frac{5}{9}}$.
(11) $\sqrt[3]{42\frac{21}{24}}$. (12) $\sqrt[3]{1\frac{1}{3} \text{ of } 5\frac{2}{5}}$.

(13) A plumber wishes to make a cistern in the shape of a cube that shall contain 110592 cub. in. of water. What must be the *internal* dimensions of the cistern?

PROFIT AND LOSS.

(1) A grocer buys 572 lbs. of tea 2*s.* 2¼*d.* per lb. and sells them at 2*s.* 6*d.* per lb.; what does he get by the transaction?

(2) A wine merchant mixes 126 gallons of wine worth 12*s.* 6*d.* per gallon with 63 gallons worth 18*s.* per gallon, and sells the mixture at 15*s.* per gallon. What profit does he make?

(3) Bought 3 cwt. 1 qr. 14 lbs. of sugar at £2 12*s.* 6*d.* per cwt. I sell 2 cwt. 2 qrs. 14 lbs. of it at 6½*d.* per lb., and the rest at 5¾*d.* per lb. What did I gain or lose by the transaction?

(4) A refiner buys sugar at the rate of £25 per ton, the cost of refining is £1 1*s.* 8*d.* per cwt. He sells the

refined sugar at the rate of 5½*d.* per lb. How much per cent. does he gain?

(5) A grocer buys 6½ cwt. of tea at the rate of 17 guineas per cwt. He sells 3 cwt. of it at 2*s.* 9*d.* per lb. and the remainder at 3*s.* 9½*d.* per lb. How much per cent. does he gain?

(6) At what rate per cwt. must a merchant purchase a quantity of tea in order that he may sell it at 3*s.* 6*d.* per lb. with a gain of 8*d.* per lb.?

(7) At what price per yd. must 300 yds. of cloth be sold which were bought at 8*s.* 6*d.* per yd. so as to give a profit of £18 2*s.* 6*d.* in all?

(8) For what sum must I sell a horse that cost me £75 10*s.* so as to gain 5¼ per cent.?

(9) What was the prime cost of an edition of a work containing 5000 copies sold at 3*s.* 6*d.* each with a profit of 30 per cent.?

(10) What must I give for 120 yds. of cloth to sell again at 8*s.* 9*d.* per yd. and to gain 25 per cent.?

(11) If by selling sugar at £2 1*s.* 6*d.* per cwt. I *lose* 4 per cent., how must I sell it per cwt. to *gain* 4 per cent.?

(12) If I buy a horse for £40, how must I sell it to lose no more than 5 per cent.?

(13) An article cost a manufacturer in material and workmanship £1 15*s.*; how ought he to sell it in order to gain 15 per cent. and allow 5 per cent. for discount?

(14) Sugar that I buy at 3¼*d.* per lb. I am able to sell at 4½*d.* What quantity of it should I buy that I may clear £10 by the transaction?

(15) A farmer buys 70 sheep for £2 5*s.* each, and sells at once 10 of the worst for £1 17*s.* 6*d.* each. At what price must he sell each of the remainder so as to clear 20 per cent. on the purchase?

(16) Goods for which I have given £70 in cash, I sell immediately for £80, but have to take a bill for 6 months; money being worth 4 per cent. per annum, what will be my gain per cent.?

(17) By selling cloth at 12*s.* 6*d.* per yd. I lost 15 per cent. At what price ought I to sell it so that I might neither gain nor lose?

(18) If 5½ per cent. would be gained by selling 121 yds. of silk for £26 11*s.* 10¾*d.*, at what price per yd. must it be sold to gain 12 per cent.?

(19) A draper buys some cloth at such a price that by selling it at 8*s.* 9*d.* per yd. he will secure a profit of 5 per cent. upon his outlay. What per centage will be gained or lost upon the same cloth if it be sold at 7*s.* 9*d.* per yd.?

(20) A wine merchant buys 2 sorts of spirits at the rate of 16*s.* 6*d.* and 10*s.* 6*d.* a gallon. He mixes them in the proportion of 5 parts of the cheaper to 7 of the dearer. At what rate per gallon must he sell it so as to make 25 per cent. profit?

FELLOWSHIP.

(1) Divide £45 between three persons, so that their shares shall be as the numbers 3, 5, 7.

(2) Three partners in a trading firm divide their year's profits into shares, which are as the numbers 6, 7, 8. If the whole profit amount to 1,678 guineas, what is the value of each share?

(3) Three partners invest £3,000, £1,200, and £2,000 respectively in a common business, and at the end of the year the profits are £744. What will be the share of each partner?

(4) Divide £954 9*s.* between *A*, *B*, and *C*, so that *A*'s share may be to *B*'s :: 3 : 5, and *B*'s share : *C*'s share :: 10 : 11.

(5) Three persons, *A*, *B*, and *C*, agree to pay their hotel bill in the proportions 4 : 5 : 6. *A* pays the first day's bill, which amounts to £2 10*s.* 10*d.*; *B* the second, which

amounts to £3 12*s.* 2*d.*; and *C* the third, which amounts to £3 17*s.* How must they settle the account?

(6) A man in his will leaves half of his property to his eldest son, one-third to his other son, and the remainder to be equally divided between his two daughters. He leaves £5,000. Supposing that the eldest son should die suddenly, what distribution of the property should be made according to the father's wishes?

(7) A man is reputed to be worth £5,000, and he leaves his eldest son £2,000, to his two other sons £1,200 each, and the rest in charities. After investigating his affairs it is found that he is really worth only £3,500. What should the fair distribution of his property be under these circumstances?

(8) Three friends, *A*, *B*, and *C*, agree to take a week's excursion together to the sea-side, on the condition that *A*, who is the richest, shall pay half the expenses; *B* and *C* each a fourth part. But unfortunately *B* is so poor that he can only pay one-eighth; what then must *A* and *C* pay, supposing that the bill amounts to £12?

(9) Two farmers, *A* and *B*, rent a field for 10 weeks, and pay £10 for it. *A* puts in 3 horses for 5 weeks, 4 cows for 8 weeks, and 12 sheep for the whole time; whereas *B* has in the field 1 horse and 30 sheep for the whole time. Supposing the keep of a horse, cow, and sheep to be in the ratio 5, 3, and 1, what part of the rent will each have to pay?

(10) *A* and *B* are engaged in partnership in a concern in which *A* advances £5,000 and *B* £7,500. The gross receipts of the business for a year are £3,200; of this one-eighth part is expended in salaries of clerks, &c., and £30 in insurance of premises. By an arrangement between the parties *A* is to receive 8 per cent. upon his capital, and *B* 4 per cent. upon his; and then the remainder of the profits is to be divided in proportion of the capital employed. Find the nett receipts of *A* and *B* respectively.

(11) Two merchants, *A* and *B*, trade together for the year. *A* puts in £1,200 for the whole year, and *B* is only able to advance £300 at the first, but puts in another £300 at the end of 3 months, and again £600 at the end of another 3 months. The profits of this business are at the end of the year £250; divide this fairly between them.

(12) *A* is a working, *B* a sleeping partner in a business. *A* possesses £1,200 of the capital, *B* £2,000. *A* receives 10 per cent. of all profits for managing the business, the rest being proportionately divided. Find the respective shares of £800 profit.

(13) A bankrupt owes to one creditor 1,000 guineas, to each of two others £500, and to each of three others £150, and his assets are £600. How much does he pay in the pound? and how much will the first creditor receive?

STOCKS.

[Unless otherwise stated no account need be taken of Brokerage.]

I. TO FIND THE AMOUNT OF STOCK.

(1) What quantity of stock will £1,488 purchase in the 3 per cents. at 77½?

(2) How much stock can be bought for £1,834 in the 3¼ per cents. at 81⅞?

(3) Find the quantity of stock at 84 that £672 will purchase.

II. TO FIND THE VALUE OF STOCK.

(4) Find the value of £4,300 stock in the 3¾ per cents. at 87.

(5) What will £525 stock in the 4 per cents. at 96 realise?

(6) What sum will purchase £731 stock in the $3\frac{1}{2}$ per cents. at $96\frac{3}{4}$?

(7) What sum of money is necessary to pay $\frac{1}{8}$ per cent. commission, and to purchase £5,000 stock in the Funds when they are at $92\frac{3}{4}$?

III. TO FIND THE YEARLY INCOME.

(8) A person invests £784 in the 3 per cents. at 84. Find what his income will be.

(9) What yearly income will a person have by investing £2,000 in the 3 per cents., when they are at $84\frac{3}{8}$?

(10) A person has £4,500 stock in the 4 per cents. when they are at $93\frac{1}{2}$. What income will he derive from it?

IV. TO FIND THE SUM OF MONEY THAT MUST BE INVESTED TO PRODUCE A CERTAIN INCOME.

(11) A man wishes to have an income of £150 a year. What sum of money must he invest in the $3\frac{1}{2}$ per cents. when they are at 85, that he may have the desired income?

(12) What sum of money must be invested in the 4 per cents. when they are at 92 that a person may derive from it an annual income of £75.

V. TO FIND THE RATE PER CENT. THAT A PERSON RECEIVES FOR HIS MONEY.

(13) Find what rate per cent. a person has for his money who invests in the $3\frac{1}{2}$ per cents. when they are at 85.

(14) What rate per cent. will be realised by purchasing 4 per cent. stock at 90?

(15) What rate per cent. does a person get for his money which is in the 4 per cents., the price of the Stock being 88?

VI.

(16) How much money must be paid for £1,500 stock of the 3 per cents. at 89⅞, allowing the broker ⅛th per cent. as commission? And what interest per cent. will be gained by the outlay?

(17) A man invests £153 14*s*. 4*d*. in the 3½ per cents. at 92, and £184 12*s*. 6½*d*. in the 2½ per cents. at 85: show that he will receive the same income as he would have received had he invested the whole sum in the 3 per cents at 90.

(18) Which is the better stock for investment, the 3¼ per cents. at 92⅝ or the 3½ per cents. at par?

(19) What interest does a man obtain by investing £3,220 in the 3½ per cents. at 80½? And if this stock rises to 92 and he then sells out, at what price must he invest in the 4 per cents. in order that his yearly income may be increased by £10?

VII.

(20) A person finds that if he invests a certain sum in railway shares, paying £6 per share when the £100 share is at £132, he will obtain £10 16*s*. a year more for his money than if he invest in the 3 per cent. consols at 93. What sum has he to invest?

(21) A person invests £2,852 in railway shares at 115, the annual dividend on each share being £5. He afterwards sells out at £125 and invests in the 3 per cent. consols at 93. Find the change in his income.

(22) A man invests £1,274 in the 3½ per cents. at 91. What income does he derive from it?

(23) How much money must be invested in the 3 per cent. consols when they are at 92½ to produce the same income as would be produced by £1,530 invested in the 3½ per cents. at 95?

(24) £3,500 of 3 per cent. stock is left by will to be transferred to a person 18 months from the present date. Find the present value of the legacy, supposing the stock to be at 91½ per cent. the eighteen months, and the rate of discount to be 4½ per cent.

(25) A person wishes to make an income of £100 per annum by investing £2,666 13*s.* 4*d.* in the 3 per cent. consols. Find what price they must be quoted at when he buys in.

(26) Consols were first quoted at 96⅜ whence they improved to 96⅝. Explain this extract from the city article of the *Times*. What would be the difference of the income arising from £1000 invested in the 3 per cent. consols at the lower quotation, and the income from the same sum invested at the higher quotation?

MISCELLANEOUS QUESTIONS ON ALL THE RULES.

(1) If 3 acres 2 roods 12 poles grow 15 qrs. 3 bus. 2 pks. of wheat, what should be the produce of 7 acres 3 roods 36 poles?

(2) If 1 qr. 2 bus. 2 pks. of wheat be worth £3 11*s.* 9*d.*; how much can be bought for £85 8*s.* 4*d.*?

(3) The expense of making the hay of 5 acres 3 roods 15 poles of meadow land amounts to £6 1*s.* 2*d.* Find what is the expense per acre.

(4) If 24 men can reap 76 acres in 6 days, how many men will reap 114 acres in 9 days?

(5) Find by practice the value of a farm of 105 acres 3 roods 16 poles at £32 1*s.* 8*d.* per acre.

(6) Find by practice the value of 63 tons 15 cwt. 40 lbs. at £1 2*s.* 8*d.* per ton.

(7) An estate is planted with 416,472 young trees at a

cost of £1 2*s*. 9*d*. per doz. Find by practice the whole expense.

(8) What sum of money will amount to £138 2*s*. 6*d*. in 15 months at 5 per cent. per annum simple interest?

(9) In what time will £537 16*s*. 8*d*. amount to £591 12*s*. 4*d*. at 2½ per cent. simple interest?

(10) A mixture of two kinds of wine in the proportion of 4 gallons of one to 11 gallons of the other is worth £1 8*s*. per gallon. The first kind being worth £1 15*s*. 4*d*. per gallon, what is the value of the second kind per gallon?

(11) A fruiterer buys 120 apples at 3 a penny, and the same number at 2 a penny; he then mixes them together, and sells them at 5 for twopence. How much does he gain or lose by the transaction?

(12) A person has a number of oranges to dispose of; he sells half of what he has and one more to one person; half of the remainder and one more to a second person; half of the remainder and one more to a third person; and half of the remainder and one more to a fourth person; by which time he has disposed of all that he had. How many had he at first?

(13) A person on leaving England exchanged his money for French money at the rate of 25 francs for a sovereign, and on arriving at Munich received 135 Bavarian gulden for 15 Napoleons; what was the loss in English money, supposing a gulden to be worth 1*s*. 8½*d*.? (1 Nap. = 20 francs.)

(14) If the difference between the simple and compound interest of a sum of money for 2 years at 5 per cent. be £5 18*s*. 9¾*d*.; find the sum.

(15) A banker on discounting a bill due in 3 months at 4 per cent. charges 5*s*. 1¼*d*. more than the true discount. Find the amount of the bill.

(16) A grocer buys 2 cwt. of tea; the first cwt. he sells at 5 per cent. profit, and the second cwt., which costs £1 more, at 12 per cent. profit; the difference of the retail

price being 4*d.* per lb. Find the cost price per lb. of each kind.

(17) Simplify $\dfrac{1}{1+\dfrac{7}{6\frac{2}{3}}}+\dfrac{7}{13\frac{2}{3}}$.

(18) In coining silver at the Mint, a composition is used consisting of silver and copper in the proportion of 37 to 3. The price of silver being 5*s.* 2*d.* per ounce, and the weight of a shilling $\frac{2}{11}$ of an ounce; what would be the exact value of the coin if it were all pure silver?

(19) A person left a sum of money which was divided equally amongst 43 people, such that after a deduction of 6*d.* in the pound, each received £2 18*s.* 3*d.* What sum did he leave?

(20) Assuming that an express train runs 40 miles an hour, and an ordinary train 30 miles an hour, and that the express fare is $\frac{1}{4}$*d.* per mile more than the ordinary; find how much an hour a man's time is worth, if it costs the same to travel by the one as by the other.

(21) A bankrupt's debts amount to £1700, and his assets to £900 15*s.* After paying costs, his creditors receive 5*s.* 9*d.* in the £. Find the amount of the costs.

(22) If 3 men can mow a field of 15 acres in $6\frac{2}{3}$ days, how long will it take 10 men to mow the same field?

(23) Reduce $2\frac{1}{2}$ gills to the vulgar and decimal fraction of $3\frac{1}{3}$ gallons.

(24) Find the cost of papering a room 5 yds. 1 ft. $2\frac{1}{2}$ in. long, 5 yds. $3\frac{1}{2}$ in. broad, 4 yds. high, with paper 9 in. wide at $2\frac{1}{2}$*d.* a yd.

(25) A box is 4 ft. long, 2 ft. 6 in. wide, 1 ft. 6 in. deep. In it are packed 400 books, each $8\frac{3}{4}$ in. long, $5\frac{1}{2}$ in. wide, and $1\frac{1}{3}$ in. thick. For how many more books $6\frac{1}{3}$ in. long, 4 in. wide, and $1\frac{1}{4}$ in. thick will there be room left?

(26) What vulgar fraction and what decimal fraction is $1\frac{1}{2}$ ft. of $\frac{1}{4}$ of a mile?

(27) How many planks each $13\frac{1}{2}$ ft. long and $10\frac{1}{2}$ in.

wide will be required for the construction of a platform 54 yds. long, and 21 yds. broad? What will be the cost at $5\frac{1}{3}d.$ per sq. ft.?

(28) If 5 horses eat 8 bus. $1\frac{3}{4}$ pk. of oats in 9 days, how long at the same rate will 66 bus. $3\frac{3}{4}$ pks. last 17 horses?

(29) Compare the simple and compound interest on £119 at the end of 3 years, at 4 per cent. per annum.

(30) A person buys equal quantities of apples at the rates of 2 a penny and 3 a penny respectively, and then mixes them. How many may he then sell for 5*s.*, so as to neither gain nor lose by the transaction?

(31) Express $\frac{2\cdot8\times11\cdot\dot{3}\dot{6}}{5\cdot6\dot{8}\dot{1}}$ as a vulgar fraction.

(32) What is the cost of papering a room 6 yds. 1 ft. 2 in. long, 6 yds. 0 ft. 4 in. broad, and 12 ft. high, with paper $\frac{1}{6}$ of a yd. wide at $4\frac{1}{3}d.$ per yd.?

(33) Reduce to the simplest form $1\frac{2}{3}-\frac{6}{8}+\frac{4}{5}-\frac{20}{24}+\frac{2}{5}-\frac{1}{2}$.

(34) What sum of money will amount to £350 19*s.* $4\frac{1}{2}d.$ in $6\frac{1}{2}$ years at $4\frac{1}{4}$ per cent. per annum, simple interest?

(35) Simplify $17\frac{1}{9}\div(3\frac{3}{10}-1\frac{1}{6}$ of $\frac{5}{12})$; and $(17\frac{1}{9}\div3\frac{3}{10})$ $-1\frac{1}{6}$ of $\frac{5}{12}$.

(36) A quantity of coffee has chicory added to it, so that the chicory is $\frac{1}{3}$ of the whole mixture; if the mixture be worth 2*s.* per lb., and the chicory 4*d.* per lb., what is the value per lb. of the pure coffee?

(37) A surveyor's chain is 22 yds. long, and is divided into 100 links. How many square links are there in a piece of land of $2\frac{1}{2}$ acres?

(38) Find the amount of £87 10*s.* at the end of 3 years, at 4 per cent. per annum, compound interest.

(39) A dairyman buys milk at $2\frac{1}{2}d.$ per quart, dilutes it with water, and sells the mixture at 3*d.* per quart. His profits are 60 per cent. upon his outlay. How much water does he mix with each quart of milk?

(40) A copyist can transcribe 3 pages of a certain work

in an hour and a half; how long will it take 3 men working only half as rapidly to copy 36 pages of another volume, the pages of which contain $\frac{1}{3}$ as much again as those of the former?

(41) A person holds £4450 in the Turkish stocks. If he sell at $52\frac{1}{8}$, and invests the proceeds in the reduced 3 per cents. at $88\frac{7}{8}$, what will be his income, supposing the broker to have received $\frac{1}{8}$ per cent. commission on each transaction?

(42) Find the value of $2{\cdot}\dot{4}\dot{5} \times 3{\cdot}1\dot{6} \div {\cdot}01\dot{2}\dot{6}$.

(43) Simplify $(\frac{7}{12} \times 4\frac{1}{3}) - \frac{4\frac{1}{4}}{3} + \left(\frac{1\frac{3}{5} - \frac{4}{15}}{\frac{2}{3} - \frac{2}{15}} \times \frac{5\frac{3}{5}}{9\frac{1}{3}}\right)$

(44) What principal will amount to £44 3*s.* $0\frac{1}{4}$*d.* in $2\frac{1}{2}$ years at $3\frac{1}{4}$ per cent. per annum, simple interest?

(45) What fraction of $\frac{3}{25}$ of £3 19*s.* 9*d.* is equal to $\frac{2}{5}$ of £1 2*s.*?

(46) Find the true discount on £237 10*s.* paid 2 years before it becomes due, at 7 per cent. simple interest.

(47) Two velocipedes, A and B, start together along a road at the rate of 6 and 7 miles an hour respectively. The circumference of A's guiding wheel is 40 inches, that of B's 36 inches. How often will the same points of the guiding wheels, which were in contact with the ground at starting, be simultaneously in contact with the ground during the first hour of their progress?

(48) Reduce to a simple fraction

$$\frac{2\frac{5}{7}}{5} - (10\frac{5}{6} \div 1\frac{12}{13}) + (\tfrac{3}{7} \text{ of } 3\tfrac{3}{4} \text{ of } 3\tfrac{4}{5}).$$

(49) If 25 lbs. of coffee at 1*s.* $2\frac{1}{2}$*d.* per lb. be mixed with 200 lbs. at 1*s.* $8\frac{1}{4}$*d.*, what is the value per lb. of the mixture?

(50) If 1 lb. of metal containing copper and zinc in the ratio of ·84 to ·16 be mixed with 2 lbs. containing the same metal in the ratio of ·75 to ·25; find how much copper and zinc there is in 1 lb. of the mixture.

(51) If it cost £135 to build a wall 150 ft. long and 9 ft.

high, how much will it cost to build a wall 200 ft. long and 8 ft. high?

(52) Find the difference between the true discount and interest of £1070 for 2 years at $2\frac{1}{2}$ per cent.

(53) How many bricks will be required for a wall 25 yds. long, 15 ft. high, and 1 ft. $10\frac{1}{2}$ in. thick, each brick being 9 in. long, $4\frac{1}{2}$ in. wide, and 3 in. deep?

(54) Add together $\frac{2}{3}$ of a crown, $\frac{13}{126}$ of a guinea, $\cdot\dot{3}$ of 18*s.* 6*d.* and $\cdot 41\dot{6}$ of £1.

(55) Find the value of $\cdot 8\dot{6}$ lb. $+ 2\cdot 3\dot{2}$ dwt. $+ 2\frac{4}{15}$ grs. of pure gold at £4 4*s.* 11*d.* per oz.

(56) If a square field contain 15·625 acres, find the length of each side.

(57) A square court has to be paved at 1*s.* 2*d.* per sq. ft.: the total cost is £48. What are its dimensions?

(58) The walls of a room 21 ft. long, 15 ft. 9 in. wide, 11 ft. 8 in. high are painted at an expense of £9 12*s.* 6*d.* Find the additional expense of painting the ceiling at the same rate.

(59) A person buys goods to the amount of £80, and sells half of them at a gain of 10 per cent.: for how much must he sell the remaining half so as to gain 25 per cent. on the whole purchase? Also for how much must he sell the remaining half so as to gain £25 on the whole purchase?

(60) A tea merchant has a better kind of tea at 2*s.* 9*d.* per lb., and an inferior kind at 1*s.* 9*d.* per lb., and mixes them in the proportion of 4 lbs. of the former to 6 lbs. of the latter. How much per lb. must he charge for the mixture so as to gain 10 per cent.?

(61) A cubic ft. of water weighs $62\frac{1}{2}$ lbs.; and a room 18 ft. 9 in. by 13 ft. 4 in. is flooded to a depth of 2 inches. What is the weight of the water in the room?

(62) A room whose height is 11 ft. and length twice its breadth takes 143 yds. of paper 2 ft. wide for its four walls. How much carpet will it require?

(63) The length of a room is double the breadth, the

cost of colouring the ceiling at 6*d.* per sq. yd. is £1 5*s.*, and the cost of painting the four walls at 2*s.* 6*d.* per sq. yd. is £15. Find the height of the room.

(64) The flooring of a room 14 ft. 3 in. long by 13 ft. 4 in. broad is composed of $\frac{1}{2}$ in. planks, each 8 in. wide and 10 ft. long. How many will be required, and what will be the weight of the whole, if 1 cubic in. of wood weighs half an ounce?

(65) Add together 37, ·37, $\frac{37}{1000}$, $37\frac{1}{200}$ and 3·7, and then multiply the sum by ·001.

(66) Simplify $\{(\cdot3 \times \cdot\dot{3}) - \cdot01\}\frac{9}{100}$.

(67) A draper buys 600 yds. of silk at 3*s.* 4½*d.* per yd., and having sold 360 yds. at 4*s.* 6*d.* per yd., and 81 yds. at 3*s.* 9*d.* per yd., he was robbed of the rest. What was his whole gain or loss, and his gain or loss per cent. on his outlay?

(68) A gentleman having 3 sons, aged 24, 16, and 8 years respectively, left his estate to be divided amongst them in shares proportional to their ages. Eight years afterwards the second son died, and left his portion to be divided between his brothers in shares inversely proportional to their ages. Find what fractional part of the father's estate each of the surviving sons *then* had.

(69) Three wheels, making 60, 36, and 24 revolutions in a minute, start with certain points in their circumferences downwards; when will they first come all together into the same position again?

(70) Two cogged wheels work together, there being 32 cogs in one, and 36 in the other. The larger wheel makes 64 revolutions in a minute. How often will the same cogs be in contact in the same position every minute?

(71) Reduce to the simplest form

$$\frac{1-\frac{4}{9}}{3\frac{1}{4}+1\frac{1}{2}+\dfrac{1\frac{2}{3}}{6\frac{2}{3}}} \times \left(\frac{1+\frac{1}{2}}{1-\frac{1}{2}}\right)^2$$

(72) A person invests £4095 in the 3 per cents. at 91;

he sells out £3000 stock when they have risen to $93\frac{1}{2}$, and the remainder when they have fallen to 85. How much does he gain or lose by the transaction? If he invests the produce in the $4\frac{1}{2}$ per cent. stock at 102, what is the difference in his income?

(73) Reduce $(\frac{6}{7}+\frac{1}{3})$ of 15*s.* 6*d.* to the fraction of $(\frac{6}{7}-\frac{1}{3})$ of a guinea.

(74) What decimal fraction of £5 is equal to $2\frac{5}{6}$ of £1 17*s.* 4*d.*?

(75) If a person can walk 26 miles 2 fur. $7\frac{1}{2}$ yds. in 7 hrs. 13 min. 20 sec., how long will a second person be in walking 36 miles 6 fur. $10\frac{1}{2}$ yds., supposing that the first walks 15 miles whilst the second walks 14 miles?

(76) Find the difference between the simple and compound interest of £3300 at $3\frac{1}{3}$ per cent. for 2 years.

(77) The first class fare from London to Doncaster, a distance of 156 miles, is 27*s.* 6*d.*; that from London to Yarmouth, which is a distance of 120 miles, is 23*s.* 11*d.* Which is the more expensive journey, and by how much per mile?

(78) Express £2 5*s.* 9·3*d.* as the decimal of £5·05.

(79) Add together $253\frac{1}{2}$, $47\frac{1}{7}$, $5\frac{1}{3}$, and $\frac{2}{3}$ of $7\frac{1}{2}$; and divide the result by ·01.

(80) If $1\frac{2}{3}$ of a sum of money = $\frac{3}{7}$ of 5*s.* 10*d.*; find the sum.

(81) A room 16 ft. 6 in. long, 12 ft. 9 in. broad, and 10 ft. 9 in. high, is to be papered with paper 20 in. wide at 1*s.* 2*d.* per yard. Allowance is to be made for a door 8 ft. 3 in. high by 4 ft. 6 in. broad, and for 2 windows each 6 ft. 6 in. by 3 ft. 6 in. What will be the expense?

(82) A merchant buys 200 yards of cloth for £105 payable at the end of 6 months, and sells them again at once at 10*s.* per yard ready money. What does he gain or lose by the transaction, if money is worth 4 per cent. per annum?

(83) What income arises from investing £3410 in the

3 per cents. at 93 after deducting an income tax of 5*d*. in the £?

(84) Find the difference between $\frac{6}{7}$ of 17*s*. 6*d*. and ·875 of 17*s*. 6*d*.; and reduce the result to the decimal of £·0125.

(85) Add together ·015 of 6*s*. 8*d*., ·015 of a guinea, and ·015 of half-a-crown; and reduce the sum to the decimal of £3.

(86) Find the fraction which added to $(\frac{2}{3} + \frac{3}{4} - \frac{6}{7})$ will make 1.

(87) Find the value of $\frac{7}{8}$ of £5 10*s*. 6*d*. $-$ $\frac{4}{7}$ of 2 guineas $+$ $(1\frac{2}{3}$ of $1\frac{1}{2})$ guinea.

(88) If the difference between the simple and compound interest of a certain sum for 3 years at $2\frac{1}{2}$ per cent. is 15*s*. $1\frac{1}{2}$*d*.; what is the sum?

(89) If A and B can do a piece of work together in 10 days which B can do alone in 15 days; how long will it take A to do $\frac{5}{7}$ of the whole?

(90) Subtract ·09 from $\cdot\dot{0}\dot{9}$, and divide the result by ·375.

(91) If the value of 7·375 cwt. is £18 4*s*.; what will be the price of $5\frac{1}{4}$ lbs.?

(92) Add together $1\frac{1}{3}$ of a guinea, $\frac{5}{8}$ of £1, $\frac{5}{16}$ of 2*s*. 6*d*. and $29\frac{19}{20}$ of $7\frac{1}{2}$*d*.

(93) Add together $1\frac{1}{15}$ of half-a-crown, $\frac{7}{16}$ £, ·25 of £1 12*s*. 4*d*. and $\cdot 0\dot{3}$ of 15*s*.

(94) The carpeting of a room twice as long as it is broad at 5*s*. per sq. yd. costs £18, and the painting of the walls at 9*d*. per sq. yd. is £5 8*s*. What is the height of the room?

(95) Simplify

$$\tfrac{3}{4} \text{ of } (2 + 7\tfrac{1}{3}) + \tfrac{7}{8} + \{\tfrac{44}{5} \text{ of } \tfrac{25}{26} \text{ of } (11 - 3\tfrac{10}{11})\}$$

(96) A wine merchant buys 50 gallons of wine for £25, and keeps 5 gallons for his own use. How must he sell the remaining quantity per gallon so as to realise a profit of 5 per cent. on the transaction?

(97) The difference between the true and common dis-

count on a certain bill for 3 months at 4 per cent. is $9\frac{51}{101}d$. What is the amount of the bill?

(98) Add together $\frac{1}{3}$ of half-a-crown, $\frac{1}{8}$ of a guinea, $\frac{4}{15}$ of £1 and $\cdot01\dot{3}$ of £1 5*s*.

(99) What must be the rate of interest in order that the true discount on £1350 payable at the end of 2 years may be £100?

(100) A, B, C, and D are four legatees under a will. A receives £56; B is to have $(\frac{4}{7} - \frac{1}{8})$ as much as A; C is to receive $\frac{2\frac{2}{3}}{3\frac{1}{3}}$ of what B receives; and D is to have $3\frac{1}{5}$ as much as C. Find what each man will receive.

(101) A person invests half his capital in the 3 per cents. at 91 and half in the 4 per cents. at par. Which investment produced the largest income? Supposing his total income to be £500, what is his capital?

(102) Twenty-five years ago a man was four times as old as his son, whose present age is 33. What is the present age of the father?

(103) If the wages of 29 men for 54 days amount to £80 9*s*. 6*d*.; how many men must work 12 days to receive £407?

(104) A person bought 374 eggs at 2 a penny and some others at 3 for 2*d*. He paid altogether £1 9*s*. 11*d*.: how many eggs did he buy at 3 for 2*d*.?

(105) Divide £35 5*s*. $1\frac{1}{2}d$. among A, B, and C; so that B may get twice, and C three times, as much as A.

(106) A mixture is made of 1 gallon of ale at 5*d*. per gallon, 3 at 9*d*., 4 at 12*d*., and 12 at 4*d*. How much per gallon is the mixture worth?

(107) A person invests £4700 in shares which are at 98, and which pay $3\frac{1}{2}$ per cent., and the same sum in the 3 per cent. Consols, which are at 94. What difference would it have made to him if he had invested the *whole* amount in the shares?

(108) Reduce to the simplest form

$$\tfrac{1}{2} \text{ of } \tfrac{1}{3} \times \tfrac{3}{4} \text{ of } \tfrac{4}{3} \div (\tfrac{7}{8} + \tfrac{1}{3} \text{ of } 20).$$

(109) Add together 536·421, 53642·1, 5·36421; and subtract the result from 100000.

(110) Find the value of $\frac{1}{4}$ of 17*s.* 8*d.* + 2·625 of 1*s.* − $\frac{3}{4}$ of $\frac{5}{8}$ of 5*s.* 4*d.* + $\cdot 26\dot{3}$ of 25*s.*; and reduce the result to the decimal of £5.

(111) Extract the square root of 356720·4 to 4 places of decimals.

(112) What will be the cost of paving a hall 50 yds. long by 50 ft. broad with marble slabs 1 ft. long and 9 in. broad;—the price of the slabs being £5 per dozen?

(113) Find the difference between the simple interest and true discount on £100 for 5 years at 5 per cent.

(114) If the present worth of £218 due 2 years hence be £200; what is the present worth of £1000 due 6 years hence at the same rate?

(115) Of the boys in a school one-third are over 15 years of age, one-third between 10 and 15. A legacy of £100 can be exactly divided amongst them by giving 10*s.* to each boy over 15, 6*s.* 8*d.* to each between 10 and 15, and 3*s.* 4*d.* to each of the rest. How many boys are there in the school?

(116) If the price of candles $8\frac{1}{2}$ in. long be 9*d.* per half-dozen, and that of candles of the same thickness and quality $10\frac{1}{4}$ in. long be 11*d.* per half-dozen; what kind do you advise a person to buy? What would be the saving per cent. should your advice be followed?

(117) Divide 210720·6 by ·4206; and ·2107206 by 42·06.

(118) If 3 ducks are worth 4 chickens, and 3 geese are worth 10 ducks, find the value of a goose; a pair of chickens being worth 4*s.* 6*d.*

(119) A tank is 20 ft. 9 in. long, 15 ft. 7 in. wide, and 6 ft. 4 in. deep; find how much water it will hold in cubic feet and inches.

(120) A person invests £1365 in the 3 per cents. at 91; he sells out £1000 stock when they have risen to $93\frac{1}{2}$, and the remainder when they have fallen to 85. How much does he gain or lose by the transaction?

(121) Find the cost of papering a room of which the length is 28 ft. 6 in., the breadth 18 ft. 9 in., and the height 12 ft., with paper 1 ft. 9 in. broad, at half a crown per yard.

(122) A cistern is supplied with two feeding pipes, capable of filling it in half an hour, and three-quarters of an hour respectively; and one discharge pipe capable of emptying it in a quarter of an hour. The cistern is full, and the three pipes are set into action together: what portion of the cistern will remain filled in three-quarters of an hour?

(123) Explain the meaning of Interest: and distinguish between *simple* and *compound* interest. Shew that the interest on £450 for 7 months at 4 per cent. per annum is equal to the discount on £460 10*s*. for the same time at the same rate per cent.; and explain why these two sums are equal.

(124) An up-train 88 yards long, travelling at the rate of 35 miles an hour, meets a down-train 88 yards long, at 12 o'clock, and passes it in 6 seconds. At 15 minutes and 3 seconds past 12 the up-train meets a second down-train 132 yards long, and passes it also in 6 seconds. At what time will the second down-train run into the first?

(125) If £100 will pay for the railway travelling of 20 travellers for 5 days of 12 hours each; how long would it last 16 travellers, travelling 6 hours a day, the rate of travelling being the same?

(126) Taking 8000 mètres to be equal to 5 miles; how many square mètres are there in an acre?

(127) Find the simple and compound interest on £2000 for 3 years at $7\frac{1}{2}$ per cent. per annum.

(128) Three men, A, B, and C, play a game, starting with equal sums; each stakes for each game $\frac{1}{3}$ of all he then has.

If A wins the first game, and B the second; what fraction of what they originally had has each left?

(129) If I buy 10 shares of £20 each at $27\frac{1}{2}$; I receive a dividend of 15 per cent., and then sell out at $37\frac{1}{2}$; how much have I gained in all?

(130) Simplify $8\frac{1}{2}-4\frac{2}{3}+\frac{3}{5}-1\frac{1}{6}$ of $\frac{2}{5}$;

$$\text{and } 1+\cfrac{1}{2+\cfrac{1}{3+\frac{1}{4}}}$$

(131) Find by practice the value of $2037\frac{1}{2}$ cwt. of soap at £1 19*s*. $4\frac{1}{2}$*d*. per cwt.

(132) Multiply ·0204 by 40·2;—Divide ·04 by 20; ·4 by ·002; ·0004 by ·0002; and 400 by ·02.

(133) Find the value of $\cdot\dot{5}4$ of $\cdot 30\dot{2}\dot{7}$ of 1 mile 6 fur. 12 poles.

(134) A closed vessel formed of metal 1 inch thick, whose external dimensions are 8 ft. 3 in., 7 ft. 5 in., and 4 ft. 3 in., weighs 3 cwt. 1 qr. 8 lbs. What would be the weight of a solid mass of metal of the same dimensions?

(135) If 9 oz. of gold 10 carats fine and 5 oz. 11 carats fine be mixed with 6 oz. of unknown fineness, and the fineness of the resulting mixture be 12 carats fine; what was the unknown fineness?

(136) If the 3 per cent. Consols are at $90\frac{5}{8}$, what sum must I invest in order to secure from them a yearly income of £470 after paying an income tax of 5*d*. in the £? Brokerage being at $\frac{1}{8}$ per cent.

(137) Find the square root of 13 to 5 decimal places.

A cubical block contains 9 cub. ft. 73 cub. inches; find the number of square yards, &c., in its surface.

(138) A sum of £600 is to be divided amongst 24 men, 36 women, and 72 boys, so that the shares of 2 men shall be equal to those of 3 women, and each woman's share to the shares of 2 children; what will be the share of each?

(139) Find what decimal of a guinea is equivalent to ·2835 of a pound sterling.

(140) What sum will amount to £820 16*s*. in $3\frac{1}{2}$ years at 4 per cent. per annum, simple interest?

(141) A merchant has teas worth 4*s*. 6*d*. and 3*s*. 6*d*. per lb. respectively, which he mixes in the proportion of 2 lbs. of the former to 1 lb. of the latter, and sells the mixture at 4*s*. 4*d*. per lb.; what does he gain per cent.?

(142) What sum must a person invest in the 3 per cent. stocks at 90 in order that by selling £1000 stock when they have risen to $93\frac{1}{2}$, and the remainder when they have fallen to $84\frac{1}{4}$, he may gain £6 5*s*. by the transaction? If he invest in the 4 per cents. at par, what will be the difference in his income?

(143) A person has a certain sum in his pocket with which he intends to pay 3 of his tradesmen, A, B, and C; he pays $\frac{3}{8}$ of what he had to A, and $\frac{4}{5}$ of the remainder to B, and what he has left, which amounts to £25, to C. How much money does he pay in all?

(144) 57 navvies are required to construct a road in 32 days; how many *additional* men must be engaged so that the work may be completed 8 days *sooner* than was at first intended?

(145) A wine merchant buys brandy at 16*s*. per gallon; dilutes it with water, and then sells the mixture at 15*s*. per gallon. His profits by the sale are 20 per cent. How much water is there in each gallon of the mixture?

(146) If £7 are the wages of 5 men and 3 boys for $3\cdot\dot{3}$ days; what will be the wages of 8 men and 9 boys for $5\cdot3$ days, supposing that 2 men earn the same as 3 boys?

(147) Subtract $\cdot03$ from $\cdot\dot{0}\dot{3}$, and divide the result by $\cdot00\dot{0}\dot{3}$.

(148) If the true discount on a sum of money due in 73 days at 5 per cent. per annum be £4 10*s*.; find the sum.

(149) 2 men can do as much as 3 women, and 3 women as much as 5 boys. How long will it take a man, a woman,

and a boy, working together, to reap a field, supposing that a man could do it alone in 62 hours?

(150) The floor of a room, which is 15 ft. high, is a square, and costs £10 16*s.* carpeting with carpet which is 24 in. wide, and which costs 4*s.* per yard. Find the expense of papering the walls with paper 18 inches wide, at 1*s.* 2*d.* per yard.

(151) Divide £163 amongst A, B, and C, so that A's share may be to B's share :: $\frac{1}{2}$: $\frac{3}{4}$; and B's share to C's share :: $\frac{5}{6}$: $\frac{7}{8}$.

(152) Find the value of £·275 + ·$\dot{3}\dot{6}$ of 6*s.* 5*d.* + ·0$\dot{3}\dot{6}$ of 18*s.* 4*d.*

(153) What sum will amount to £1041 17*s.* 3*d.* in 3 years at 5 per cent. per annum, compound interest?

(154) A cattle dealer buys 17 oxen for £357, payable at the end of a year. After losing 2 by disease he sells the remainder at £24 each, ready money. Find his gain per cent., calculating interest at 5 per cent. per annum.

(155) A father has two sons; to the elder he bequeaths (·8 − ·1$\dot{6}$) of his estate, and the remainder to his younger son. It is found that the elder son receives £700 more than the younger. Find the value of the father's property.

(156) A merchant desires to pay a bill of £973 15*s.* which is due in 6 months' time; what amount of 3 per cent. stock at 94$\frac{7}{8}$ must he sell out in order to do so, supposing the rate of interest to be 5 per cent. per annum, and allowing brokerage $\frac{1}{8}$ per cent.?

(157) Find the value of ($\frac{4}{5}-\frac{2}{3}$) of £2 8*s.* 9*d.* + (·$\dot{7}$ − ·7) of £2 12*s.* 6*d.* + ($\frac{3}{4}$ − ·625) of £1 8*s.* 8*d.*

(158) A grocer buys soap at £2 6*s.* 8*d.* per cwt., and by selling it at a profit of 20 per cent. gains £3 4*s.* 2*d.* by the transaction. What quantity of soap did he purchase?

(159) Simplify $(39 \cdot 538 \div \cdot 53) \div (\cdot\dot{2}\dot{7} \times \cdot\dot{3})$.

(160) A person buys 200 shares of railway stock, for which he gives £100 a share. When they are paying £2

per cent., he sells them all at £46 per share, and invests the proceeds in the 3 per cent. Consols at 92. Find the alteration in his income.

(161) A contractor undertakes to finish a certain work in 60 days; after 30 men have been working upon it for 20 days, it is found that they have completed only $\frac{1}{4}$ of it; how many *more* men must be employed to finish the contract in the *specified* time?

(162) Simplify
$$\frac{3}{1-\frac{3}{4+\frac{5}{6}}}$$

(163) If the 3 per cent. Consols are at $91\frac{7}{8}$; what sum of money must be invested in them in order to secure a net yearly income of £702, after deducting an income tax of 6*d.* in the £? Brokerage being at $\frac{1}{8}$ per cent.

(164) A dairyman buys pure milk at 8*d.* per gallon, and then mixes it with water in the proportion of 1 pint of water to 7 pints of milk. How must he sell the mixture per gallon in order to gain 25 per cent.?

(165) Simplify $\frac{22\cdot 4}{\cdot 25}+\frac{250}{\cdot 8}+\frac{1\cdot 2}{\cdot 0075}$.

(166) Find the square roots of $342\frac{1}{4}$, and of ·00005625.

(167) To $3\frac{1}{2}$ of $5\frac{1}{6}$ add $\frac{2}{3}$ of $(6\frac{1}{4}-1\frac{1}{2})$; and from this sum subtract $\frac{2\frac{1}{6}}{\frac{2}{3}}$.

(168) A block of stone which measures 5 ft. 6 in. in length, 4 ft. 8 in. in width, and 3 ft. 9 in. in depth, is valued at £16 0*s.* 10*d.* Find the value per cubic yard.

(169) If 7 men can do as much work as 12 boys, and if 16 boys can do a certain work in 12 days; in what time can 8 men and 20 boys together do it?

(170) Simplify $(\cdot\dot{6}+\cdot 75+\cdot 8\dot{3})\div(1\frac{1}{3}\text{ of }\cdot\dot{2}\dot{7}\text{ of }3\cdot\dot{6})$.

(171) If the true discount on £226 2*s.* 8*d.*, due at the end of a year and a half, is £12 16*s.*; what is the rate per cent. per annum, reckoning simple interest?

(172) A father whose age is 40 will in 8 years' time be

three times as old as his son; what is the son's present age?

(173) Two workmen, A and B, can together build a wall in 18 days which B alone could build in 30 days. Find what time it would take A alone to do it.

(174) A merchant buys 1212 yards of cloth at 6*s.* 8*d.* per yard, payable in three months' time (reckoning interest at 4 per cent. per annum): he sells immediately $\frac{2}{3}$ of it at a profit of 1*s.* per yard, but the remainder at a loss of 5 per cent. on the invoiced price. Find his gain in all, and his gain per cent.

(175) By what decimal fraction must 25 be multiplied in order that their product may equal the sum of $\cdot 1\dot{6}$, $\frac{1}{3}$, and $\cdot 25$?

(176) A quantity of tea is sold at 4*s.* 7*d.* per lb. with a profit of 10 per cent. and a total gain of £2 1*s.* 8*d.* Find how many lbs. of tea were sold.

(177) Simplify

$$\frac{4\frac{1}{6}}{\frac{7}{16}\text{ of }3\frac{1}{5}}-\left(\tfrac{2}{7}\text{ of }\frac{2\frac{2}{3}+1\frac{1}{6}}{2-\frac{4}{25}}\right)$$

(178) The expense of paving a court-yard 20 yards long was £56; if the breadth had been two yards more the expense would have been £64: what is the width of the court-yard?

(179) 7 men and 13 boys earn together as their daily wages the sum of £1 16*s.*, whereas 14 men and 6 boys would receive daily £2 5*s.* 4*d.* Find the daily wage of each.

(180) 50 men are able to make a road in 20 days, but after working 5 days, 20 men leave; in how many days *in all* will the work be finished?

(181) By what decimal fraction must $4\frac{11}{16}$ be multiplied that their product may equal the quotient of 171·99 divided by 27·3?

(182) A merchant, by postponing the payment of his debts from Feb. 21 to Feb. 26, effects a saving of £5. Find

the amount of his debts, reckoning interest at 5 per cent. per annum.

(183) Chicory is mixed with coffee bought at 1*s*. 4*d*. per lb. in the proportion of 1 lb. of chicory to 7 lbs. of coffee. The mixture is sold at 1*s*. 6*d*., which gives a profit of 20 per cent. Find the buying price per lb. of the chicory.

(184) A merchant bought 3 cwt. of tea at a uniform price: he sold half of it at 2*s*. 8*d*. per lb., one-third of it at 2*s*. 4*d*. per lb., but the remainder, which was inferior, he sold for 1*s*. 6*d*. per lb., at a loss of 10 per cent. Find the whole gain, and the gain per cent.

(185) Simplify

$$\frac{3}{8-\dfrac{7}{2-\frac{3}{4}}}+\frac{5}{6-\dfrac{5}{2-\frac{5}{6}}}$$

(186) If 3 men, 8 women, and 6 boys receive together £1 15*s*. 2*d*. for a day's work, and 2 men receive the same as 3 women or as 7 boys; find what 4 men, 10 women, and 7 boys together will receive in 5 days.

(187) A wine merchant has two different kinds of brandy which he bought at 32*s*. and 24*s*. per gallon respectively: he mixes them in the proportion of 3 gallons of the better quality to 5 gallons of the inferior. At what price per gallon must he sell the mixture to gain 20 per cent.?

(188) The difference between the true discount and simple interest on a bill payable in 3 months at 4 per cent. per annum is $5\frac{95}{101}$*d*.; what is the amount of the bill?

(189) A merchant buys a certain number of yards of cloth at 5*s*. per yard; he sells half of them at 6*s*. 4*d*. per yard, but the remainder being damaged, he can only dispose of at a loss of 10 per cent. under the invoiced price. His gain on the transaction was £14 3*s*. 4*d*. Find how many yards he purchased.

(190) A person after paying an income tax of 5*d*. in the £, and also afterwards the interest on a mortgage of

£4000 at 3 per cent., has £820 left. Find his gross income.

(191) To walk a distance of 16 miles it is calculated that 5 hours will be required. The first 8 miles are walked at the rate of $3\frac{3}{4}$ miles an hour, the next 4 miles at the rate of $3\frac{1}{2}$ miles an hour. At what rate per hour must the remaining distance be walked so as to accomplish the whole distance within the specified time?

(192) Simplify $(1\cdot1\dot{3} \div \cdot00\dot{0}13\dot{2}) \times (\cdot004 \div \cdot32)$.

(193) A farmer has 300 acres of wheat to get in in 10 days, and employs 30 men for that purpose. After they have been working 4 days, he finds that they have completed only 100 acres; how many *additional* men must he engage to complete the work within the desired time?

(194) The difference between the simple and compound interest of a certain sum for 3 years at $2\frac{1}{2}$ per cent. per annum is 15*s.* $1\frac{1}{2}$*d.*: what is the sum?

(195) A alone can do a piece of work in 8 hours, which B can do alone in 10 hours, and C alone in 12 hours. They all begin to work together, but A only continues to work until it is finished, whilst B works only 3 hours, and C 2 hours. In what time *in all* is the work accomplished?

(196) A alone can build a wall in 30 days, which B alone could do in 25 days. After A has been working 10 days B comes to help him. In how many days after B's joining A will the work be finished?

(197) Find the value of $2\cdot25$ of $\cdot0\dot{6}$ yd. + $7\cdot\dot{2}\dot{7}$ of $4\cdot62$ yds. $-\left(\frac{2\frac{1}{2}}{4} - \cdot125\right)$ yd.

(198) Simplify

$$\frac{7\frac{1}{7} - 3\frac{1}{8}}{6 + 4\frac{3}{4}} \div \frac{5\frac{1}{3} + 1\frac{1}{7}}{6\frac{1}{7} - 2\frac{1}{3}}$$

(199) A number of poor people have distributed amongst them in equal shares the sum of £48; but if they had each received 1*s.* 6*d.* more than they did, then £54 would have been required. How much did each person receive?

(200) The polishing of the entire surface of a cubical block of marble at 2*s.* 6*d.* per square ft. costs £22 13*s.* 9*d.*: what is the value of the marble at 3*s.* 4*d.* per cub. ft. ?

(201) Find the value of $£5{\cdot}\dot{6}+{\cdot}25s.+{\cdot}0375£-2{\cdot}875$ of 6*s.* 8*d.*

(202) By selling 624 yds. of cloth at a loss of 4 per cent. I lost altogether £15 12*s.*: what is the buying and selling price per yard ?

(203) An army tailor, who employs 60 men, is able to complete an order which he has received in 25 days; but after the men have been at work 10 days, he receives notice to complete the whole in 12 more days. How many *additional* men must he engage ?

(204) A bankrupt's liabilities amount to £12,000, and he agrees to pay his creditors 3*s.* 4*d.* in the £ at the end of 3 months, 5*s.* in the £ at the end of 6 months, and 4*s.* in the £ more at the end of 9 months. Find the present worth of his assets, reckoning interest at 5 per cent. per annum.

(205) If 6 lbs. of tea and 8 lbs. of coffee cost £1 12*s.* 6*d.*, and 3 lbs. of tea and 11 lbs. of coffee cost £1 5*s.*; find the price per lb. of the tea and coffee respectively.

(206) Bought a quantity of tea at 2*s.* 6*d.* per lb., which I sold at a profit of 25 per cent. and of £15 in all; how many lbs. were bought ?

(207) A large mansion could have been sold at a loss of 15 per cent. for £3145, and the money arising from the sale would have brought in 4 per cent. per annum. After standing unoccupied for a year, it is sold at a profit of 12 per cent. How much would be gained by keeping the property unsold for 12 months ?

(208) Find the value of $\frac{6}{8\frac{1}{2}}$ of £2 11*s.* $+{\cdot}56\dot{6}$ of $3\frac{1}{17}$ of £1 2*s.* 6*d.* $+1{\cdot}25$ of $£{\cdot}04+{\cdot}075$ of 13*s.* 4*d.*

(209) A luggage train leaves London at 6 A.M., and proceeds at the rate of 20 miles an hour, and at 7.30 A.M. a passenger train is despatched in the same direction at the

rate of 32 miles an hour. At what time will the luggage train be overtaken, supposing that 12 minutes an hour are spent by the luggage train in stoppages, whereas the passenger train loses only 5 minutes an hour?

(210) How much water must be mixed with 50 gallons of milk, purchased at 8*d.* per gallon, in order that by retailing the mixture at 9*d.* per gallon a profit of 25 per cent. may be realised by the transaction?

(211) A person buys an inferior quality of brandy at 24*s.* per gallon: he mixes it with a better quality in the proportion of 3 gallons of the inferior to 1 gallon of the better. He then sells the mixture for 28*s.* 9*d.* per gallon, at a profit of 15 per cent.: what is the price per gallon of the better brandy?

Cambridge Junior Paper, 1872. 212 to 221.

(212) Divide £1005 12*s.* between A and B, so that A may have 5 times as much as B.

(213) Add together $7\frac{9}{20}$, $12\frac{4}{15}$, $4\frac{7}{12}$, $\frac{9}{40}$, and $3\frac{7}{10}$.

Simplify the expression $\dfrac{(4\frac{1}{2}+7\frac{1}{2})\div 3\frac{1}{2}}{\frac{1}{7}\times 2\frac{2}{7}\times 5\frac{1}{4}}$

(214) State the rules for the multiplication and division of decimals.

Multiply ·01 by ·001, and divide ·1 separately by ·1, ·01, and 1000.

Prove your results in each case by vulgar fractions.

(215) Find (by practice) the value of $784\frac{1}{2}$ sheep at £2 12*s.* 10*d.* each.

(216) If 40 women can do a piece of work in 20 days, in how many days will 15 men do the same work, the work of 5 women being equal to that of 3 men?

(217) Find a sum of money such that $5\frac{2}{13}$ of it shall be equal to 7·2 of £5 3*s.* $9\frac{1}{12}$*d.*

(218) Find the area of the walls of a room 12 ft. 6 in. high, 16 ft. 8 in. in length, and 15 ft. 9 in. in width, and the expense of papering them with paper 32 inches wide at $2\frac{1}{4}$*d.* per yard.

(219) Find the simple interest on £127 9*s.* 4½*d.* at $3\frac{1}{8}$ per cent. per annum for 4 years and 2 months.

(220) A person investing in the 3 per cents. receives $3\frac{1}{3}$ per cent. interest for his money. What is the price of the stock?

(221) Supposing an arithmetic paper to be done by 2500 persons, of whom one-fifth are girls and the rest boys, and supposing 5 per cent. of the boys to fail and 40 per cent. of the girls to fail, find what per-centage of the whole number of candidates succeed in passing.

Cambridge Senior Paper, 1872. 222 to 232.

(222) What number (in the denary scale) is represented by the number 2345 in the scale of notation whose radix is 6?

(223) A bar of gold weighing 196 lbs. 10 oz 10 dwts. is cased in lead weighing 24 lbs. 14 oz. find the whole weight avoirdupois.

(224) Simplify

$$\frac{1\frac{1}{8}}{1\frac{3}{14}} \div \left\{ \left(\frac{3}{17} \times 1\frac{1}{2}\right) - \frac{1}{18\frac{8}{9}} \right\}$$

And divide 8·064 by $\{\cdot 84\dot{6} + \frac{20}{7} \text{ of } \cdot 291\dot{6}\}$.

(225) Find the square root, and the integral part of the cube root of 1032256.

Find the value of $\frac{4}{\sqrt{17}-3}$ correct to four places of decimals.

(226) Find by practice the value of 15 cwt. 1 qr. 7 lbs. at £7 10*s.* 9*d.* per qr.

(227) What is the value of a block of a certain material 5 ft. 3 in. long, 2 ft. 4 in. wide, and 1 ft. 2 in. thick, worth four guineas per cubic foot?

If the block weigh a cwt., what will one of the same material 7 ft. long, 1 ft. 9 in. wide, and 10 inches thick weigh?

(228) Find the true discount on a bill of £698 17*s.* 8½*d.*, due in 1 year 7 months, at $4\frac{3}{4}$ per cent. per annum, simple interest.

(229) If 4 men, working 7 hours a day, do a piece of work in 5 days and 1 hour, how many hours a day must 6 men work to do twice as much in 6 days and 4 hours, allowing for a half-holiday on one of the 6 days?

(230) At noon on Monday, one clock is a minute slow, and another two minutes fast; at eight on Wednesday morning the first is right, and the second is a minute slow: when was the second right, and when were they together?

(231) A merchant buys 4000 quarters of corn, one-fifth of which he sells at a gain of 5 per cent., one-fourth at a gain of 10 per cent., one-half at a gain of 12 per cent., and the remainder at a gain of 16 per cent. If he had sold the whole at a gain of 11 per cent. he would have made £72 16*s*. more: what was the cost of the corn per quarter?

(232) What is the gain by investing £1950 at $97\frac{3}{8}$, and selling out at 104, brokerage being on each transaction $\frac{1}{8}$ per cent.?

(233) Find the greatest number of which 979 and 12727 are multiples; and the least number of which 736, 713, and 690 are divisors.

(234) Divide 9·80548 by $3\frac{4}{25}$; $1{\cdot}3\dot{6}$ by ${\cdot}2\dot{7}$; 1·05 by ${\cdot}1\dot{2}\dot{6}$.

(235) If it costs £260 to support a family of 6 persons for 12 weeks; how much will it cost to keep a family of 10 persons for 3 weeks, when the cost of living has advanced 20 per cent.?

(236) Divide £600 amongst 25 men and 15 women, giving each woman £2 less than a man.

(237) Find the difference between the true discount and simple interest of £360 for 73 days, at $2\frac{1}{2}$ per cent. per annum.

(238) In how many years will £1000 double itself, at 4 per cent. per annum, simple interest?

(239) How much chicory worth 5*d*. per lb. must be mixed with coffee worth 1*s*. 3*d*. per lb., so that I may have a mixture of 70 lbs., worth 1*s*. per lb.?

(240) Simplify (giving answer in a vulgar fraction)

$$\frac{4\frac{1}{2}}{5\frac{3}{4}} \text{ of } \cdot 01\dot{3}\dot{6} \text{ of } \frac{4\cdot\dot{3}}{\cdot 2\dot{7}}.$$

(241) A wine-merchant buys 120 gallons of wine for £96. How much water must be mixed with it so that, when it is sold at 18*s.* a gallon, a profit of 20 per cent. may be obtained?

(242) A, B, and C can do a piece of work together in 8 days, which A and B could do together in 12 days, and B and C together in 14 days. Find how long it would take each of them separately.

(243) Find the value of $\cdot\dot{3}$ of £1 + $\cdot 4$ of 3*s.* $7\frac{3}{4}$*d.* + $\cdot 5$*d.* $-\frac{2}{15}$ of 11*s.* 3*d.*

(244) Find the difference between $2\cdot 0\dot{8}\dot{1}$ of £1 7*s.* 6*d.* and $\cdot 0\dot{5}$ of £1 2*s.* 6*d.*

(245) If a person invest all his money in the 3 per cent. Stock, he will receive an annual income of £320; but if he invest in the 4 per cent. Stock at 96, he would then receive £400. Find what money he has to invest; and what is the price of the 3 per cent. Stock.

(246) Find the length of paper 10 inches wide required for lining the whole internal surface of a cubical box which contains 37 cub. ft. 64 cub. in.

(247) Find the least number which, when divided by 18, by 20, and by 24 respectively, will leave a remainder 3 in every case.

(248) Simplify $$4\frac{5}{8} + \frac{\dfrac{2\frac{3}{4}}{4\frac{7}{12}}}{4\frac{1}{6}+\dfrac{2\frac{1}{2}}{6}}.$$

(249) Find the value of $20-\frac{3}{4}-\frac{5}{6}+2\frac{1}{2}$ of $1\frac{1}{5}-10\frac{1}{8}+\frac{3\frac{5}{8}}{4\frac{1}{2}}$.

(250) Divide $\cdot 37848$ by $\cdot 456$; $3\cdot 7848$ by $\cdot 0456$; and $3784\cdot 8$ by $\cdot 00456$.

(251) The difference between the simple and compound interest of a certain sum of money for 2 years at 4 per cent. per annum is £1 8*s*. Find the sum.

(252) 300 lbs. of coffee worth 1*s*. 10*d*. per lb. are mixed with the same quantity worth only 1*s*. 6*d*. per lb. What should be the selling price per lb. to gain 10 per cent. on the outlay?

(253) Express as decimals, and add together

$$2\tfrac{27}{32},\ 7,\ 3\tfrac{13}{50},\ \cdot00125,\ \text{and}\ 17\cdot875$$

(254) Divide £1000 amongst A, B, and C, so that A may have twice as much as B and £20 besides, and C receive £110 less than twice A's share.

(255) What number multiplied by itself will give 1038361?

(256) $\frac{1}{4}$ of the coins in a desk are crowns, $\frac{1}{3}$ florins, and $\frac{1}{5}$ are shillings, and there are 26 copper pieces. What is the number of coins in all?

(257) What sum of money put out at compound interest for 3 years at 5 per cent. per annum will amount to £3087?

(258) The water in a large cistern, which is 12 ft. 6 in. long and 8 ft. 6 in. wide, has sunk 6 inches. How many gallons of water have been run off, reckoning $6\frac{1}{5}$ gallons to the cubic foot?

(259) Find the G.C.M. and L.C.M. of $\frac{2}{3}$, $\frac{3}{4}$, $\frac{4}{5}$, and $\frac{5}{6}$; and also of $3\frac{1}{5}$, $4\frac{1}{6}$, $6\frac{1}{8}$ and $8\frac{3}{4}$.

(260) A railway contractor engages to finish 3 miles of road in 200 days, and employs for that purpose 90 workmen. After they have been working 65 days, he finds that they have completed only 6 furlongs of it. How many *additional* men must he employ to complete the work within the specified time?

(261) How many lbs. of tea, worth 2*s*. 6*d*. per lb. and 3*s*. per lb. respectively, must be mixed together so that the mixture may be worth 2*s*. 8*d*. per lb.?

(262) Reduce $\frac{2}{9}$ of £2 5*s*. + ·26 of £1 0*s*. 10*d*. − $1{\cdot}0\dot{3}$ of 11*s*. to the decimal of £·5.

(263) Find the price of the 3 per cent. Stock, so that a person, after deducting an income-tax of 6*d*. in the £, may receive $3\frac{1}{2}$ per cent. on his outlay.

(264) If $2{\cdot}1\dot{2}\dot{6}$ of a cwt. cost £5, what will $\cdot\dot{3}\dot{6}$ of a ton cost?

(265) Find the value of $\cdot 0\dot{4}\dot{5}$ of 3 qrs. 4 lbs. + 2·34 of 1 cwt. 1 qr. 10 lbs. + $\dfrac{3\frac{31}{48}}{\frac{5}{12}}$ of 1 cwt.

(266) At what rate per cent. will £326 amount to £472 14*s*. in 15 years?

(267) A person invests £27900 in the 3 per cent. Stock at 93. What is his income? And if the first year's dividend be invested in railway stock at 90, which pays a dividend of 4 per cent. per annum, what will be his income in the second year?

(268) Find the difference between

$$\frac{\frac{1}{3} \text{ of } 1\frac{1}{4} - \frac{1}{9}}{\frac{3}{28} \text{ of } 1\frac{5}{6} \text{ of } 3\frac{2}{11}} \text{ of £1 } 10s. \text{ and } \frac{4\frac{1}{3} - 3\frac{1}{4}}{6\frac{1}{3} + 2\frac{1}{12}} \text{ of } 8s.\ 5d.$$

(269) Find the price of a carpet $2{\cdot}\dot{6}$ ft. wide, which will be required for carpeting a floor, which is $19{\cdot}\dot{6}$ ft. long and 12 ft. wide, at 4*s*. 6*d*. per yard.

(270) Multiply $1{\cdot}01\dot{7}$ by 118·8; and divide ·0635 by $2{\cdot}\dot{5}\dot{6}$.

(271) What number, added to $3\frac{1}{4}$, $\frac{1}{5}$ of $11\frac{1}{9}$, $(2\frac{1}{4} - 1\frac{1}{8})$, will make the sum 15?

(272) Find the square root of 27·04 × 106·09.

(273) Divide £1750 amongst A, B, C, and D, giving B twice as much as A, C twice as much as B, and D one-fourth as much as all the others together.

(274) A cistern can be filled by a supply-pipe A alone in 20 minutes, and by supply-pipe B alone in 30 minutes. After they have been running together for 3 minutes, A is stopped. Find how long B must run alone to fill the cistern.

(275) Find the simple interest on £840 for 7 years 7 months, at £3 2*s*. 6*d*. per cent. per annum.

(276) Will it be more advantageous for a merchant to sell goods which have cost him £200 at a profit of 25 per cent. and allow discount at 5 per cent. on the selling price; or, to sell at a profit of 19 per cent. and allow no discount?

(277) Prize-money to the amount of £210 is distributed amongst a certain number of sergeants, twice as many corporals, and ten times the number of privates. Each private receives £2, each corporal £6, and each sergeant £10. What is the number of men in all?

(278) If $\frac{2}{3}$ of a number exceed $\frac{2}{3}$ of its remainder by 120; what is the number?

(279) The price of coal has advanced 40 per cent. during the last year; but a manufacturer, by economy, spends on his coal no more than he did before. By how much has he reduced his consumption of coal?

(280) How many yards of carpet $1{\cdot}8\dot{3}$ ft. wide will be required for a floor which is 14·6 yards long and 12·25 yards wide?

(281) Find the price of the 3 per cent. Stock, when an investment of £3761 5*s*. produces an income of £127 10*s*.

(282) Divide ·0289 by 17000; 289 by ·00017; 180 by ·08; $40\frac{13}{50}$ by $\cdot1\dot{4}\dot{5}$.

(283) If 3 men 4 women and 6 boys reap a field in 3 days, working 10 hours a day; how long will it take 6 men 2 women and 9 boys to reap a field three times as large, and working only 8 hours a day (supposing 1 man=2 women =3 boys)?

(284) The wine in a cask is worth 16*s*. per gallon; but, after being mixed with 2 gallons of water, the mixture is worth only 15*s*. per gallon. How many gallons of pure wine were there?

(285) The difference between the discount and simple interest on a certain sum for $1\frac{1}{2}$ years at 4 per cent. per annum is £2 10*s*. $11\frac{17}{53}$*d*. What is the sum?

(286) What fraction is that from which, if $\frac{1}{2}$ of $\dfrac{2\frac{1}{3}-\frac{1}{3}\text{ of }5}{2\frac{1}{3}+\frac{1}{3}\text{ of }5}$ be subtracted, and the remainder divided by $\dfrac{3\frac{1}{5}}{4\frac{4}{5}}$, the result is $\frac{5}{12}$?

(287) A person who pays away $\frac{2}{3}$ of his money at one shop, and $\frac{3}{4}$ of the remainder at another, finds that he has £5 10*s*. left. What had he at first?

(288) Find the simple interest on £450 for 3 years 2 months 21 days, at £4 6*s*. 8*d*. per cent. per annum (1 month = 28 days).

(289) A merchant buys 400 yards of cloth; one fourth of it he sells at a profit of 10 per cent., and $\frac{3}{4}$ of it at a profit of 5 per cent. If he had sold them all at a profit of 8 per cent. he would have made £5 5*s*. more than he did. What was the cost price per yard?

(290) Find the value of $(\frac{2}{3}+\frac{1}{4})$ of £1 16*s*. + $(\frac{4}{5}-\frac{1}{3})$ of £2 5*s*. + $(1\frac{1}{4}$ of $1\frac{2}{5})$ of £5 4*s*. $-$ $(2\frac{1}{4}\div 6\frac{3}{4})$ of £1 10*s*.

(291) A wine-merchant buys 200 gallons of wine at 13*s*. per gallon. After using a certain number of gallons himself, he sells the rest at 15*s*. per gallon, with a profit of 5 per cent. on his entire outlay. Find the number of gallons that he consumed himself.

(292) 30 men will be required to complete a certain work in 20 days, but after working together for 6 days, 10 men throw up their work. How many days, *after* the strike, will the remaining men take to finish the work?

(293) What must be the price of the 3 per cent. Stock, so that if £36,000 be invested in them a person may receive an income of £1185, after paying an income tax of 3*d*. in the £?

(294) Simplify $\frac{1}{5}$ of $\frac{5}{9}$ of $\frac{9}{11}$ + $3\frac{2}{3}$ of $\frac{7}{22}$ + $\frac{9}{29}$ $(\frac{5}{6}+\frac{7}{9})$.

(295) Find the profit on the sale of an edition of a work containing 5200 copies, when the retail price is 3*s*. 6*d*. The publisher allows 25 per cent. discount to the retail book-

seller, and reckons 13 copies to the dozen, and the cost of printing, &c., is estimated at 1s. 3*d.* per copy.

(296) Divide the difference between $\frac{2\frac{5}{6}}{3\frac{7}{9}}$ and $\frac{3\frac{3}{5}}{12}$ by their product.

(297) Find by practice the produce of a field of 17 acres 2 roods 16 poles, when an acre yields 4 quarters 3 bushels $2\frac{1}{2}$ pecks.

(298) The true discount on a sum of money due 2 years hence, at $4\frac{1}{2}$ per cent. per annum is £76 10*s.* What is the sum?

(299) The difference between the compound and simple interest on a certain sum for 3 years at 5 per cent. per annum, is £4 11*s.* 6*d.* What is the sum?

(300) Find the value of $(\cdot 144)^2 \div 1200$.

(301) Extract the cube root of 2460·375.

(302) What is the least number which, when divided by 98, leaves a remainder 97; when divided by 35 leaves a remainder 34; and when divided by 49 leaves a remainder 48.

(303) A manufacturer formerly sold an article at 11*s.*, gaining thereby 10 per cent. The cost of manufacturing has lately advanced 25 per cent. Find at what price it must *now* be sold so as still to gain 10 per cent.

(304) The true discount of £736 15*s.*, which is due at the end of 15 months, is £35 1*s.* 8*d.* At what rate per cent. is interest allowed?

(305) Divide £198 amongst 15 men 15 women and 18 boys, giving each woman $\frac{1}{3}$ less than a man, and each boy $\frac{1}{3}$ less than a woman. What is the share of each?

(306) An egg-importer buys eggs at $\frac{1}{2}$*d.* each, to the value of £120; but some of them proving unfit for sale, he sells the good ones at a profit of 20 per cent., and gains £5 on his outlay. What is the number of bad eggs?

(307) Find the value (as a decimal fraction) of $12\cdot675 - 3\cdot75 + 7\frac{13}{16} + 6\frac{9}{25} - 3\frac{17}{320} - (3\frac{1}{3} \text{ of } \cdot075)$.

(308) Divide $3\frac{1}{6}-2\frac{1}{5}+1\frac{1}{9}$ by $\frac{3}{4}+\frac{4}{9}-1\frac{1}{6}$.

(309) Find by practice the cost of making a road which is 5 fur. 10 poles 2 yds. long, at £360 per mile.

(310) Divide £125 amongst A, B, and C, so that A may have four times as much as B, and C one-fourth of A's and B's shares together.

(311) If 3 men earn as much as 5 women per day, and if 12 men together with 6 women earn £10 8*s*. in 4 days; what number of women must work along with 10 men that together they may earn £19 13*s*. 4*d*. in 10 days?

(312) Reduce $\dfrac{3\frac{1}{3}-2\frac{1}{4}}{2\frac{1}{5}+3\frac{2}{3}}$ of £8 16*s*. to the fraction of $\dfrac{6\frac{1}{2}}{12}$ of £4 16*s*.

(313) What principal will amount to £731 4*s*. at the end of 4 years 9 months, at 3 per cent. per annum, simple interest?

(314) Find the value of $\cdot 4\dot{3}$ of 7*s*. 6*d*. + $\frac{5}{8}$ of ·64 of 12*s*. 6*d*. + $\dfrac{\frac{11}{12}}{3\frac{7}{16}}$ of £1 10*s*.

(315) Three per cent. Stock, bought at $91\frac{3}{4}$, is held for 6 months, during which time one half-yearly dividend is received, and it is then sold at $93\frac{7}{8}$. If a commission of $\frac{1}{8}$ per cent. is paid on the purchase and sale; what is the rate per cent. per annum of interest obtained by the transaction?

(316) A coal-proprietor formerly sold coal at 14*s*. 8*d*. per ton, and gained thereby 10 per cent., but now he sells it at 25*s*. per ton. Find his gain per cent. *now*, supposing that the expense of working the coal has advanced 30 per cent.

(317) The true discount on a certain sum of money for $2\frac{1}{2}$ years is £100, and the simple interest for the same time is £110. Find the rate per cent. per annum, and the sum.

(318) From $4\cdot\dot{3}$ of £6 3*s*. $9\frac{1}{3}$*d*. subtract $1\frac{8}{25}$ of $\cdot 4\dot{2}\dot{9}$ of £40.

(319) Find the greatest number that will divide 268, 431, and 720, leaving remainders 4, 2, and 5 respectively.

(320) What fraction of £2 17*s.* 6*d.* must be added to $\left(\frac{6\frac{3}{4}}{10\frac{1}{8}}-\frac{1\frac{2}{5}}{4\frac{1}{5}}\right)$ of £1 2*s.* 6*d.* to make the sum equal to £2.

(321) Find the compound interest on £2000 for 2 years 8 months at 5 per cent. per annum.

(322) Simplify

$$\frac{10+\dfrac{1}{10-\frac{1}{10}}}{5-\dfrac{1}{5-\frac{1}{5}}}\div\frac{2\frac{82}{759}}{10}.$$

(323) Express as a vulgar fraction

$$\frac{12}{5\frac{1}{7}}+2\tfrac{2}{3}\text{ of }3\cdot75+4\cdot8\dot{6}\dot{3}.$$

(324) Find the number whose square when multiplied by ·012 gives ·243.

(325) Find the G.C.M. of 233·289 and 483; and also of 504 and 3177·3.

(326) Express $\frac{23\cdot2\div\cdot\dot{4}}{\cdot825\times\cdot\dot{3}\dot{6}}$ as a vulgar fraction.

(327) A grocer, having three kinds of sugar, worth 2½*d.*, 3*d.*, and 4*d.* per lb. respectively, wishes to make a mixture of 120 lbs., which shall be worth 3½*d.* per lb. In what way must he mix them?

(328) A merchant buys cloth for £300, which he sells immediately, but receives in payment a bill for £336 12*s.*, which is due 4 months hence, interest being calculated at 6 per cent. What is the gain per cent.?

(329) Simplify $9\tfrac{1}{2}-5\tfrac{1}{4}+3\tfrac{1}{5}-2\tfrac{1}{5}\text{ of }\tfrac{9}{22}+\frac{7\frac{2}{3}}{2\frac{5}{9}}$.

(330) At Liverpool the mean annual rainfall is estimated to be 35 inches. Find the length of the side of a cubical reservoir which would hold all the rain that falls on an acre of land in the year. (Give this answer in integers only.)

nary Arithmetic, still it will be found desirable that the should spend the last few months in running over a few sums under each rule, and it is believed that this collection will furnish a sufficient number of Questions for that purpose.

Besides, it possesses the additional recommendation of presenting the Candidates with the very Questions that have been proposed in the Local Examination Papers of previous years.

II. To pupils whose principal time is devoted to the Higher Mathematics, or who have gone through an ordinary Arithmetic.

A master has often great difficulty in finding a collection of Examples which will compel a pupil to think and to use all the ingenuity he possesses, but at the same time wi not weary him with a great amount of *needless* figure making.

It is hoped that this collection will answer that purpose satisfactorily.

III. As Examination Papers for testing the real knowledge of a class *after* they have gone through any rule in Arithmetic.

The Questions are generally of such a practical character, and are worded in such a variety of ways, that they cannot but prove useful tests of a pupil's real progress. Let a master place this collection in the hands of a class *af* they have worked through an Arithmetical rule, and will then be able to see how far they have thoroug understood what they have been doing.

Any correction or any suggestion for the improvement of the work will be most thankfully received.

A. HILEY.

THORP-ARCH SCHOOL, YORKSHIRE.

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5 tons 19 cwt.

(331) Divide the sum of $\frac{6}{7}$ of $3\frac{1}{9}$ and $(3\frac{1}{4}-2\frac{1}{5})$ by their difference.

(332) How much tea worth 2*s.* 6*d.* per lb. must be mixed with 240 lbs. of tea worth 3*s.* 4*d.* per lb., to make a mixture worth 3*s.* per lb.?

(333) Find the value of $\frac{2{\cdot}5 \times 5{\cdot}1\dot{6}}{6{\cdot}2 \times 6{\cdot}25}$.

(334) A mass of silver and alloy weighs 210 lbs., and in it there is 1 lb. of alloy to 6 lbs. of silver. How much alloy must be added so that there may be 2 lbs. of alloy to 9 lbs. of silver?

(335) Find the value (in a vulgar fraction) of

$$3\tfrac{1}{4} - 2\tfrac{1}{2} \text{ of } 1{\cdot}\dot{3} + \frac{3\frac{1}{2}}{\frac{4}{7}} + 6{\cdot}8 - 2{\cdot}1\dot{6}$$

Cambridge Junior Paper, 1873. 336 to 348.

(336) The jewels upon the sword of the Shah of Persia being worth two millions three hundred thousand and fifty shillings, upon his scabbard four hundred and four thousand shillings, and upon the rest of his dress ten millions one hundred and thirty-five thousand nine hundred and fifty shillings. How many Armstrong guns would they purchase worth three thousand pounds each?

(337) Reduce £36 3*s.* $4\frac{1}{2}$*d.* to halfpence.

(338) Twenty railway wheels together weigh 2 tons 15 cwt. 1 qr. 2 lbs. What is the weight of each?

(339) What is the cost of telegraphing to a distance of 3800 miles a message consisting of 300 English and 150 Persian words, at the cost of $\frac{1}{2}$*d.* per mile for every 50 English, and $\frac{3}{4}$*d.* per mile for every 30 Persian words?

(340) Fifty members pay $7\frac{1}{2}$*d.* each per week for 20 weeks into a coal club; to this are added 5 subscriptions of £1 1*s.* each, and 10 of 10*s.* 6*d.* each from other sources; the cost of keeping the accounts being 10*s.* How much coal at £1 13*s.* per ton can be provided out of the remaining funds for each of the 50 members?

(341) Add together $\frac{1}{2} + \frac{3}{8} + \frac{4}{15} + \frac{7}{24}$; and simplify $\dfrac{3\frac{1}{2} - 1\frac{7}{8}}{3\frac{1}{4} \times 2\frac{1}{2}}$

(342) Explain the method by which you can most simply multiply or divide a decimal by 1000.

Multiply ·3 by ·2; and divide 800 by ·00125.

(343) The water of a certain company contains ·002 of organic impurity, and ·003 of metallic impurity, and ·02 of chalk. Find what vulgar fraction of the whole is pure water.

(344) Find by practice the cost of apartments for 22 weeks $5\frac{1}{4}$ days at £1 5*s.* 8*d.* per week.

(345) If 1000 square yards of meadow land produce a load of hay; how many loads will 25 acres produce?

(346) A cubic foot of wood weighs 20 lbs. Find the weight of 10 planks, each 30 feet long, 1 foot wide, and 1 inch thick.

(347) Find the simple interest on £1505 2*s.* $1\frac{1}{2}$*d.* for $5\frac{1}{2}$ years, at 8 per cent. per annum; and the compound interest on £1000 for 2 years, at $2\frac{1}{2}$ per cent. per annum.

(348) Find the square root of 144·7209.

Cambridge Senior Paper, 1873. 349 to 359.

(349) What are expressed by the digits 6, 5, 2, 9, respectively, in the number 615·209? Express in words the number 4167306002015.

(350) Simplify

$$\frac{\frac{1}{3} + \frac{2}{11} + \frac{7}{24} - \frac{1}{3} \text{ of } \frac{2}{11} \text{ of } \frac{7}{24}}{1 - \frac{1}{3} \text{ of } \frac{2}{11} - \frac{2}{11} \text{ of } \frac{7}{24} - \frac{7}{24} \text{ of } \frac{1}{3}}.$$

(351) State the rule for the division of decimal fractions. Divide ·00015 by ·016; 6·1 by ·0025, and by 2500.

(352) State the rule for converting a mixed circulating decimal into an equivalent vulgar fraction.

Find the value of $\cdot 8\dot{3}$ of 13*s.* 4*d.* + $\cdot 13\dot{8}$ of £1 4*s.*; and express the result as the decimal fraction of £5.

(353) Find by practice the value of 5 tons 19 cwt. 3 qrs. 24 lbs. at £5 13*s.* 11*d.* per cwt.

(354) An imperial gallon contains 277·274 cubic inches, and a cubic foot of water weighs 1000 oz. avoirdupois. Find the weight of a pint of water correct to within one-thousandth part of an ounce.

(355) Find the square root of 1079521; and of ·1079521; and find the value of $\frac{3}{\sqrt{19}-4}$ correct to 4 places of decimals.

(356) What do you mean by the present worth of a bill? Illustrate your answer by an example. What sum of money paid down will discharge a debt of £1000 due in two equal half-yearly instalments, interest being reckoned at 5 per cent. per annum, simple interest?

(357) A man invested a sum of money in the 3 per cent. Consols at 88, and at the end of $4\frac{1}{2}$ months, after receiving one half-year's dividend, sold out at $87\frac{7}{8}$. At what rate per cent. per annum did he receive interest on his capital?

(358) 5 town-workmen can do the same amount of work as 9 country-workmen. What will be the difference in expense to a contractor between employing 15 town-workmen, or 10 town and 12 country-workmen to do a piece of work which the 15 town-workmen could finish in 10 days; the wages of a town and country-workman being respectively 7*s.* 6*d.* and 4*s.* 6*d.* a day?

(359) A gentleman, deriving all his income from a railway investment paying 4 per cent. on his capital, spends $\frac{2}{3}$ of his gross income on personal expenses, and pays an income tax of 6*d.* in the £. Next year the railway dividends are $4\frac{1}{4}$ per cent., his personal expenses are 10 per cent. more, and the income tax is reduced to 4*d.* in the £, and he finds that he is £5 richer. What was his original income?

(360) Simplify
$$\cfrac{4}{4+\cfrac{4}{4+\cfrac{4}{4+\frac{2}{3}}}}.$$

(361) Divide ·00984126 by the product of 4·03 and ·407.

(362) A can do a piece of work in 30 days, and B can do the same in 20 days. After A has been working at it alone for 16 days, B helps him for 2 more days, and then C joins them. The work is now completed in 3 more days. How long would it have taken C alone to do the whole work?

(363) At what time between 8 and 9 o'clock will the two hands of a watch be together?

(364) If 3 men or 5 boys can be kept 4 months for £25; what sum will keep 5 men and 12 boys for 3 months, when the price of provisions is 20 per cent. more now than it was?

(365) A tradesman marks an article 15 per cent. above cost price, but he allows his customer 5 per cent. discount for ready money; what rate per cent. of profit does he really gain by the transaction?

(366) How many lbs. of tea at 2*s.* 3*d.* per lb. must be mixed with 60 lbs. at 1*s.* 10*d.* per lb., so that the mixture may be sold at 2*s.* 6*d.* per lb. with a profit of 20 per cent.?

(367) The difference between the compound and simple interest on a certain sum for 3 years at 4 per cent. per annum is £12 3*s.* 2⅖*d.* Find the sum.

(368) A person investing his money in the 4 per cents. at 92 receives a certain income, but if he had invested it in the 3⅓ per cents. at 69, his income would have been £16 13*s.* 4*d.* more than it is; what money did he invest?

(369) The lengths of the paces of two persons are respectively 2 ft. 6 in. and 2 ft. 3 in. How far will they have walked when one has taken 704 more steps than the other?

(370) Express $\cdot 25\dot{3}$ of 6*s.* 3*d.* as the decimal of ·35 of £2 10*s.*

(371) If the cost of carpeting a room 21 ft. long and 16 ft. wide with carpet, which is worth 3*s.* 2*d.* per yard, is £8 17*s.* 4*d.*; find the width of the carpet.

(372) The lining with tin of the sides and bottom of a cubical box at 4*d.* per sq. ft. costs £2 1*s.* 8*d.*; how many books, which are 8 in. long, 5 in. wide, and $1\frac{1}{8}$ in. thick, will it hold?

(373) A milkman buys daily 36 gallons of milk at 8*d.* per gallon; how much water must he mix with it so that by selling the mixture at 9*d.* per gallon he may clear 25 per cent. profit?

(374) A person sells out £2400 stock in the 3 per cent. Consols at 93, and invests the proceeds in railway stock which pays 6 per cent. interest, and thus improves his income by £52. Find the price of £100 of the railway stock.

(375) Find the square root of 18947·5225, and of $2\frac{137}{196}$.

(376) Find the value of $\cdot\dot{0}\dot{1}$ of 1 cwt. 3 qrs. 2 lbs. + ·44 of 1 cwt. 3 qrs. + $2\cdot 3\dot{4}\dot{5}$ of 3 qrs. 26 lbs.

(377) Twenty bars of iron 20 inches long, 3 inches broad, and 2 inches deep are melted down, and made into a cube; what is the edge of the cube?

(378) Simplify $\dfrac{\frac{1}{9} \text{ of } (3\frac{2}{3}+4\frac{1}{7})\div 2\frac{1}{9}}{2\frac{2}{5} \text{ of } \frac{5}{9}+3\frac{3}{5}}$.

(379) 42 yards 2 ft. of carpet which is 27 inches wide are required for carpeting a room which is twice as long as it is broad; what are the dimensions of the room?

(380) What sum of money must be invested in the 3 per cent. Consols when they are at 90, so that a person may receive a clear income of £429 after paying an income tax of 6*d.* in the £?

(381) What is the price of 1 lb. of coffee, if 5 lbs. of coffee are worth 2 lbs. of tea, and 7 lbs. of tea are worth 80 lbs. of sugar, and 3 lbs. of sugar cost $10\frac{1}{2}$*d.*?

(382) Simplify $\dfrac{\cdot 041\dot{6}\div\cdot\dot{6}\dot{0}}{\cdot 02\dot{2}\dot{7}\div\cdot 0\dot{0}\dot{3}}$.

(383) What is the selling price of an article which costs 38*s.* in its manufacture, so that a commission of 5 per cent.

may be allowed to the agent, and the manufacturer also may receive a profit of 15 per cent. ?

(384) The length of a room is three times its width, and the area of the floor is 2883 sq. ft.; what are its dimensions?

(385) A road which is half a mile long is to be made in 15 weeks, and 30 men are employed on it who work 8 hours a day. When 5 weeks have elapsed, it is found that only 220 yards have been finished; how many *additional* men must be put on so that all working 10 hours a day they may finish it in the specified time?

(386) A French kilogram weighs 2·2046 lbs. avoirdupois; how many are there in 1 cwt. ?

(387) The sum of £250 is borrowed on July 5, of which £100 is paid on September 20, another £100 on November 1, and the rest on December 20; what sum will pay the balance and interest, reckoning interest at 4 per cent. per annum?

(388) Simplify $\dfrac{4\frac{4}{15} \text{ of } 2\frac{5}{8}}{5\frac{1}{5} - 4\frac{1}{2}} + \dfrac{6\frac{3}{4} - 1\frac{5}{14}}{2\frac{1}{6} + 1\frac{3}{7}}$.

(389) The length of a cistern is 12 ft., its breadth 8 ft., and its depth 6 ft.; find the number of gallons that have been drawn off when the water has sunk 6 inches, reckoning $6\frac{1}{5}$ gallons to the cubic foot.

(390) Two workmen A and B receive for their united wages at the end of the week £2 10*s*., which is to be shared according to the time that they have worked. A has worked uniformly 8 hours a day, but B has been idle one day, and has worked on the other days 4, 5, 6, 6, and 5 hours respectively; what division of the money must be made?

(391) During the heavy rains in July 1875, rain fell to the depth of $4\frac{1}{2}$ inches in one day in South Wales. Find the length of a cubical cistern which would hold all the water that fell on an acre of land, and also the weight of water, reckoning that 1 cubic foot of water weighs 1000 oz. avoirdupois.

(392) Simplify $\frac{3\frac{1}{4}}{4\frac{1}{3}}$ of $\frac{\cdot 1296}{10\cdot 8} + \cdot 476$.

(393) Find the cost price of 300 engravings to an engraver, who has sold them all at a profit of 2*s.* 6*d.* each, and of $16\frac{2}{3}$ per cent.

(394) A tradesman sells 45 yards of cloth at 5*s.* 9*d.* per yard, with a profit of 15 per cent.; what is his whole gain?

(395) A wine merchant buys whisky at 15*s.* per gallon, which he dilutes with water in such a manner that when he retails the mixture at the same price he gains 20 per cent.; how much water is there in every gallon of the mixture?

(396) Add together $\cdot\dot{9}\dot{0}$ of £1 13*s.*, $\cdot 41\dot{6}$ of £1 16*s.*, and $\cdot 5\dot{3}$ of £3.

(397) Divide ·05819 by the square root of ·0529.

(398) A person has £3000 which he invests in the 3 per cent. Consols at 92, whilst another person has £3000 Stock in the same investment. Find the difference in the two incomes.

(399) Divide £900 amongst three persons in such a manner that $\frac{1}{3}$ of A's share, $\frac{1}{4}$ of B's, and $\frac{1}{5}$ of C's may be all equal.

(400) In a factory the boys, women, and men are in the proportion of 4, 3, and 2. A man receives 2*s.* 9*d.*, a woman 2*s.* and a boy 1*s.* 6*d.* a day, and the daily wages amount to £26 5*s.* in all. Find how many there were of each.

(401) Find the length of a room which is 15 ft. wide, and which costs £24 6*s.* carpeting with carpet which is 30 inches wide, and worth 4*s.* 6*d.* per yard.

(402) £1001 is invested in the $3\frac{1}{2}$ per cent. Stock at 91. After receiving a whole year's dividend upon it, the Stock is sold out, and the total gain is £60 10*s.*; at what price per cent. was it sold?

(403) The square root of a number when multiplied by 8 is 60; find the number.

(404) If a person had sold his horse for £75 instead of

for £72, he would have gained 5 per cent. *more* than he did. Find the cost price of the horse.

(405) A fruiterer buys £3 worth of oranges at the rate of 3 for 1*d.*, and those that are good he sells at a profit of 25 per cent., but on account of the number that are bad he clears only 5*s.* altogether. Find how many are bad.

(406) The height of a tower on the bank of a river is 48 ft., and the breadth of the river is 36 ft.; what is the length of a string which reaches from the top of the tower to the opposite side of the river?

(407) Simplify $\dfrac{3}{1+\dfrac{4}{2+\frac{3}{4}}} \div \dfrac{\frac{2}{3}-\frac{1}{4}}{1\frac{1}{3}\div 3\frac{1}{9}}$.

(408) Divide ·0169 by 1300, by 16·9, and by ·0013 respectively.

(409) How many square tiles $3\cdot\dot{3}$ inches long will be required for paving a hall which is $20\cdot\dot{5}$ ft. long and 18·4 ft. wide?

(410) $\frac{1}{3}$ of a person's property is invested in the Funds, $\frac{1}{5}$ in railway debentures, $\frac{1}{6}$ in mortgages, and the remainder, which amounts to £3000, is in the bank; what is the value of his property?

(411) A person buys some land for £64 an acre, which, when let out so as to yield him 3 per cent. interest for his money, brings him in an annual income of £240. Find how many acres he bought.

(412) If a person invests a certain sum of money in the $3\frac{1}{2}$ per cent. Stock at 87 he will receive £29 10*s.* less income every year than he would have received had he invested the same money in railway stock at 91, which pays a yearly dividend of 4 per cent. Find what money he had to invest.

(413) A tea merchant buys a quantity of tea at 1*s.* 6*d.* per lb., double the quantity at 1*s.* 8*d.* per lb., and three times the quantity at 1*s.* 10*d.* per lb. He mixes them together and sells the mixture at 2*s.* per lb. Find his gain per cent.

(414) 300 books which are $8\frac{1}{2}$ inches long, $4\frac{1}{2}$ inches broad, and $1\frac{1}{9}$ inch thick, are packed in a box which is 3 ft. 4 in. long, 1 ft. 8 in. wide, and 1 ft. 8 in. deep. How many more books which are $6\frac{1}{2}$ inches long, 5 inches wide, and 1 inch thick, will it hold?

(415) What is the price per lb. of meat *now*, when we get 4 lbs. less for £1 than we did a short time ago when meat was 2*d*. a lb. cheaper?

(416) Divide £1970 amongst A, B, and C in the proportion of $\cdot 4$, $\cdot\dot{4}$, and $\frac{1}{4}$.

(417) Find the time between 10 and 11 o'clock when the two hands of a watch are directly opposite to each other.

(418) Dividing a certain number by $3\cdot 2$, we get a quotient $4\cdot 1$, and a remainder $2\cdot\dot{3}$; what is the number?

(419) Add together $\frac{1}{3}$, $\frac{1}{4}$ of $3\frac{1}{3}$, and $\frac{3}{5\frac{1}{3}} - \frac{2\frac{3}{4}}{11}$.

(420) If the true discount on £1079 2*s*. 5*d*. which is due at the end of a year and a half be £75 5*s*. 9*d*.; what is the rate per cent. per annum, reckoning simple interest?

(421) If 3 men and 4 boys can reap 5 acres in two days, and 5 men and 3 boys can reap 13 acres in four days; how long will it take 4 men and 6 boys to reap 21 acres?

(422) Find what sum of money will amount to £3575 in 6 years at 5 per cent. per annum, simple interest?

(423) Find the value of $\cdot 425$ of 1*s*. 8*d*. $+ 3\cdot\dot{7}$ of 3*s*. 9*d*. $+ 4\cdot 1\dot{3}$ of 6*s*. 3*d*.; and express the result as the fraction of 2 guineas and a quarter.

(424) By selling a horse for £60 a person lost 20 per cent., but he ought to have gained one-third as much per cent. as the horse cost him. How much under value did he sell the horse?

(425) A tobacconist mixes together two kinds of tobacco worth 5*s*. and 6*s*. per lb. respectively in such a manner as to have 3 lbs. of the cheaper to 2 lbs. of the dearer. He sells the mixture at 6*s*. 3*d*. per lb.; what does he gain per cent.?

(426) If the 3 per cent. Consols be at $91\frac{7}{8}$, what sum must a person invest in that Stock in order to secure an income of £708 after paying an income tax of 4*d.* in the £, brokerage being at $\frac{1}{8}$ per cent.?

(427) A person has £4 6*s.* in half-crowns, shillings, and sixpences, and the numbers of the coins of each kind are as 4, 7, and 9. Find how many there are of each kind.

(428) Simplify $\frac{(\frac{4}{5}-\frac{3}{11})\ (3\frac{1}{4}+2\frac{4}{5})}{(\frac{3}{4}\text{ of }\frac{5}{9}+2\frac{1}{4})\div 1\frac{5}{6}}$.

(429) A French mètre measures 39·3708 inches; find how many mètres there are between London and Edinburgh, which is a distance of 409 miles.

(430) A corn factor purchases 600 quarters of wheat at a certain price per quarter. He sells $\frac{1}{3}$ of them at a profit of 15 per cent., and the rest at a profit of 10 per cent.; but if he had sold them all at a profit of 12 per cent. he would have gained £5 more than he did. Find the cost price of the wheat per quarter.

(431) Simplify $\frac{(1{\cdot}7)^3}{\sqrt[3]{614125}}$.

(432) Add together $3\frac{1}{7}$ of a guinea, $\frac{13}{20}$ of half a sovereign, $\frac{3}{8}$ of a crown, ·44 of 4*s.* 2*d.*, $\cdot 25\dot{3}$ of 6*s.* 3*d.*; and express the result as the fraction of 3 guineas.

(433) A room which is 19 ft. long and 12 ft. high requires 840 sq. feet of paper to cover its walls, without making any deduction for windows and door. Find the cost of a carpet for the floor which is 2 ft. wide and costs 2*s.* 9*d.* per yard.

(434) A bankrupt fails and his debts amount to £6000, and on this he promises to pay 5*s.* in the £ at the end of 3 months, 4*s.* more at the end of 6 months, and 5*s.* more at the end of 9 months. Find what sum of money now would be equivalent to these three separate payments, reckoning money worth 4 per cent. per annum.

(435) A cattle dealer bought 50 oxen for £800. He

sells 10 of them at cost price, and 10 more at 5 per cent. loss. Find how much he must charge for each of the remainder so as to make £100 by his bargain.

(436) A father has two sons and a daughter, and dies worth £38,000. To the elder son he leaves as much as to the younger son and daughter together, but the daughter receives £2000 less than the younger son. Find what each received.

(437) A person buys shares in a lead mine at £30 a share, when £20 has been paid, and after paying a call of £5 per share, he sells them again at £45 a share. Find how much per cent. he gains.

(438) A garrison was provisioned for 40 days, but after 10 days an additional force of 500 men was sent into the fort, and then the provisions were exhausted after 20 more days. How many men were there in the garrison at first?

(439) Find the difference between the price of 769 articles at 6*s*. $4\frac{2}{3}$*d*. each, and of $769\frac{2}{3}$ articles at 6*s*. 4*d*. each.

(440) Simplify $(\frac{1}{4}+\frac{2}{9})\div(\frac{3}{5}-\frac{5}{12})\times\frac{1\frac{1}{4}\text{ of }6\frac{2}{5}}{3\frac{1}{3}-1\frac{5}{9}}$.

(441) Reduce $\frac{3\frac{3}{4}}{10}$ of 7*s*. 4*d*. to the fraction of $\frac{\frac{13}{51}}{1\frac{9}{17}}$ of 10*s*

(442) Find the value of $\cdot\dot{5}9\dot{2}$ of £4 1*s*. + $\cdot\dot{9}7\dot{2}$ of £3 14*s*. $-\cdot8\dot{7}\dot{4}$ of £2 1*s*. 3*d*. + $\frac{6\frac{2}{3}}{7\frac{5}{6}}$ of £2 7*s*.

(443) If 16 men can build a wall 30 yards long in 20 days, working 6 hours a day, find how many men would be required to build a similar wall 48 yards long in 15 days working 8 hours a day, supposing that 8 extra men are put on the last 3 days.

(444) The amount realised by the sale of a house after deducting the agent's commission at $2\frac{1}{2}$ per cent. was £402 13*s*. 6*d*. Find what the house was sold for, and the agent's commission.

(445) Divide 100, ·01 and ·0001 each by 6·25.

(446) What sum of money will amount to £1352 in 2

years at 4 per cent. per annum, reckoning compound interest.

(447) A cubic foot of water weighs 1000 oz. avoirdupois, and the weight of water in a rectangular cistern, which is 6 ft. long and 4 ft. broad, is 26 cwt. 3 qrs. 4 lbs. Find the depth of the water.

(448) What must be the selling price of 20,000 yds. of cloth, which cost 11*s.* 6*d.* a yard in their manufacture, so as to allow a commission of 5 per cent. to the agent, a profit of 20 per cent. to the manufacturer, and also a margin of 10 per cent. for the risk of bad debts?

(449) How much Stock must be bought in the 3 per cent. Consols at $89\frac{1}{8}$ in order that by selling at $91\frac{3}{8}$ a gain of £45 may be effected?

(450) In a besieged town the garrison has provisions which, allowing each man 2 lbs. daily, would last 40 days, but after 10 days 100 men are lost in a sortie: the provisions are now made to last 50 days in all by reducing each man's allowance to $1\frac{3}{5}$ lb. Find the original number of men in the garrison.

(451) Divide $\frac{7}{9}$ of $1\frac{2}{7}-\frac{6}{13}$ by $1\frac{1}{2}$ of $2\frac{2}{3}-2\frac{1}{12}$.

(452) Add together $\frac{3}{8}$ of £11, $\frac{1}{3}$ of $\dfrac{1}{3\frac{3}{5}}$ of £2 14*s.*, and $\frac{3}{4}$ of 6*d.*; and reduce the result to the decimal of £4.

(453) What vulgar fraction is equal to the sum of ·25, 015, and $\dfrac{9{\cdot}6195}{12{\cdot}1}$?

(454) Divide £3300 between A and B in such a manner that the simple interest on A's share at 3 per cent. per annum for 4 years may be equal to the simple interest on B's share at 5 per cent. per annum for $7\frac{1}{2}$ years.

(455) Divide $(\cdot 13)^2$ by $(1{\cdot}3)^2$.

(456) The length, breadth, and height of a room are as 4, 3, 2; the expense of carpeting the floor with carpet 27 inches wide, and worth 3*s.* a yard, is £9 12*s.* Find the cost of papering the walls with paper 2 ft. wide and worth 8*d.* per yard.

(457) If by selling cloth at 12*s.* per yard 5 per cent. *more* is gained than by selling it at 11*s.* 6*d.* per yard, what was the cost price per yard?

(458) A sum of money is left by will, and a legacy duty of 10 per cent. is paid upon it, and the rest, when invested in the 4 per cents. at 90, gives a clear income of £474 a year after paying an income tax of 3*d.* in the £. Find the money left.

(459) A person buys a house for a certain sum of money, and spends £200 on its repairs. He then lets it for £180 a year, and so gets 6 per cent. on his outlay. Find what the house cost.

(460) A contractor for a building, which is estimated to cost 10,000 guineas, agrees to accept 4 equal quarterly payments of £2500 instead of the lump sum at the end of the year. Supposing that money is worth 4 per cent. during the year, find how much he will gain or lose by this plan.

(461) A and B have the same number of shots at pigeons, and they kill between them 62. It is found that 3 out of every 4 shots of A's, and 4 out of every 5 of B's, take effect. How many shots did each fire?

(462) A cistern can be filled by one pipe A in 6 hours, and by another pipe B in 8 hours, and can be emptied by a third pipe C in 5 hours. A and B are opened alone until the cistern is half full, and then the discharge pipe C is opened. Find what time *in all* the cistern will take filling.

(463) Simplify $\dfrac{(5\frac{1}{5}-3\frac{1}{2}) \div 1\frac{1}{4} \text{ of } \frac{4}{15}}{8\frac{2}{3} \div (\frac{3}{4} + \frac{5}{6})}$.

(464) Find the value of $\cdot 8\dot{6}$ of 15*s.* + $\cdot 01\dot{5}$ of 18*s.* 9*d.* + $1\cdot\dot{8}\dot{4}$ of 8*s.* 3*d.*

(465) Five workmen can do a certain work in a week, working 8 hours a day; how long must 4 workmen work each day so that by doing one-ninth more work than the others did per hour, they need only work 4 hours on Monday, and still complete the work within the week?

(466) Reduce ·0625 of 6*s.* 8*d.* to the decimal of $\cdot\dot{3}\dot{6}$ of 9*s.* 2*d.*

(467) If 8 men and 6 boys reap 15 acres in 2 days, and 5 men and 8 boys can reap 23 acres in 4 days; how many boys will be required along with 3 men to reap 17 acres in 4 days?

(468) The length, breadth, and height of a room are as 4, 3, and 2, and the contents are 5184 cubic feet. Find the dimensions of the room.

(469) At what rate per cent. per annum will £4000 amount to £4630 10*s.* in 3 years at compound interest?

(470) If $2{\cdot}3\dot{4}\dot{5}$ be added to a certain number, and the sum be divided by $7{\cdot}\dot{5}\dot{7}$ the quotient is $\cdot 3\dot{6}$; what is the number?

(471) A merchant buys cloth to the value of £810, and in payment gives a bill which is due in 3 months. He sells the cloth immediately for £850; what is his gain per cent., reckoning interest at 5 per cent. per annum?

(472) A, B, and C are partners in a concern, and they put in capital in the proportion of 3, 2, 1, and agree to share the profits in that proportion. An increase of 2 per cent. in the profits gives A an additional £60; what is the entire capital?

(473) A bankrupt pays 12*s.* 6*d.* in the £ on half of his debts, and 10*s.* in the £ on the other half, and pays in all £1800: find the amount of his debts.

(474) A tradesman borrows money at 4 per cent. per annum, and after finding no use for it for a month, he meets with some goods by which he intends to clear 12 per cent. profit for himself; what per-centage must he charge on the outlay?

(475) A person sells 3 per cent. Consols when at 91, and invests in the $3\frac{1}{2}$ per cent. Stock at 95. Find by how much per cent. the interest on his investment will be improved.

(476) Simplify $\dfrac{\frac{4}{7}+\frac{3}{11}}{1-\frac{4}{7}\text{ of }\frac{3}{11}}+\frac{3}{14}\text{ of }\dfrac{4\frac{5}{9}}{6\frac{1}{6}}\text{ of }\dfrac{6\frac{8}{11}}{11\frac{5}{7}}$.

(477) Find the value of

$$4{\cdot}75 - 3{\cdot}125 + (6{\cdot}75 \times {\cdot}02) - \frac{{\cdot}0625}{25}.$$

(478) Add together ·1875 of 10 guineas, $\frac{3}{13}$ of $\cdot 4\dot{3}$ of a £, ·025 of 25 shillings.

(479) When flour is at 50*s.* per quarter, a tradesman sells 3 lbs. of bread for 4*d.*, clearing a certain profit. If the price of flour has fallen to 40*s.* per quarter, but his other expenses have increased 10 per cent.; what weight of bread must he now sell for the same money so as to clear the same profit?

(480) A person buys a house for £1600, which is let for £120 a year, but half of the purchase money remains on mortgage at 4 per cent. per annum. He lays out £200 in repairs and improvements, and the average cost of repairs yearly is £40. Find what per cent. of interest he will receive for his money.

481. If it costs £8 8*s.* to carpet a floor which is 18 ft. long and 14 ft. broad with carpet, which is worth 5*s.* per yard; what is the width of the carpet?

(482) Two friends, A and B, save in the course of a certain number of years the same amount of money. A saves uniformly £100 a year, whilst B saves only £70 the first year, but increases the amount £10 every year. Find how much each saved, and how long it took them.

(483) A person bought 45 shares in a gas company at £35 per share, and when they rose to £42 he sold out and invested the proceeds in Russian 5 per cent. Stock at 105. Find his income from the latter investment.

(484) A merchant buys cloth to the value of £650 for ready money, but, dreading a fall in the price, he sells it immediately at a loss of 10 per cent.: the price rising afterwards, he found that if he had kept it for 3 months longer, he could have sold it for 25 per cent. more than he did. What did he sell the cloth for, and how much might he have gained by waiting? (Money is worth 4 per cent. per ann

(485) Find the price of the 3 per cent. Consols, so that after an income tax of 8*d.* in the £ has been deducted, a person may receive 4 per cent. interest for his money.

(486) The area of a rectangular field, whose length is four times its breadth, is 3 ac. 856 sq. yds.; find its dimensions.

(487) Simplify $\frac{(5\frac{1}{5}-3\frac{1}{2})\div 1\frac{1}{4} \text{ of } \frac{4}{15}}{8\frac{2}{3}-(\frac{3}{4}+\frac{5}{6})}$.

(488) Multiply the sum of four tenths, four thousandths, and four ten-thousandths by ten thousand, and divide the product by forty-five thousandths.

(489) If 6 men or 10 boys could do a piece of work in 45 days, working 8 hours a day; in what time could 4 men and 10 boys working together at the rate of 6 hours a day do it?

(490) A cistern whose base is a square, and height 3 ft. 4 in., contains 174240 cubic inches. Find the side of the base.

(491) A room, whose height is 12 ft., and length twice its breadth, takes 224 yds. of paper 18 inches wide for its four walls. Find the expense of carpeting the room with carpet which is 2 ft. wide, and worth 4*s.* 6*d.* a yard.

(492) In what time will £240 amount to £333 at 5 per cent. per annum, simple interest?

(493) A pipe A could fill a cistern in 30 minutes, whilst another pipe B could empty it in 20 minutes. After A has been running for 20 minutes, B is then allowed to run, and they both remain open for 15 more minutes, when B is closed. Find how long the pipe A must continue running before the cistern is full.

(494) A person bought a house on speculation for £800, and, after paying £150 for repairing it, he sold it for £1100. What was his gain per cent. allowing $\frac{1}{2}$ per cent. to the agent for commission on both the buying and selling price?

(495) Simplify $\dfrac{(4\frac{1}{3}-3\frac{1}{2})\div\frac{3}{4}\text{ of }2\frac{2}{3}}{5\frac{2}{3}\text{ of }\dfrac{3}{4\frac{2}{3}}}$.

(496) A rectangular plot of land, whose width is 111 yards, contains 3 ac. 1908 sq. yds. What will be the distance from one corner to the opposite corner across the field?

(497) A train which is 88 yards long, takes 10 seconds in passing over a bridge which is 44 yds. long. Find when it will reach the next station, which is 10 miles off.

(498) A road is to be made in 60 days, and 30 men are employed to do it, working 8 hours a day, but after 40 days it is found that only half of the work has been done. If 5 additional men are then put on, and they all work 9 hours a day to the end; how will the work stand at the end of the specified time?

(499) Divide £969 amongst A, B, and C, in such a manner that when A receives a guinea, B receives a sovereign, and when B receives half-a-crown, C receives a florin.

(500) The length and breadth of a rectangular cistern are 3 ft. 6 in. and 2 ft. 6 in.; how deep must it be to contain 300 gallons of water, when 1 gallon contains 277·25 cubic inches?

(501) Find the value of (correct to 6 places of decimals)

$$4+\frac{1}{1\cdot2}+\frac{1}{1\cdot2\cdot3}+\frac{1}{1\cdot2\cdot3\cdot4}\text{ \&c.}$$

(502) Three vessels whose respective rates of sailing are 8, 10, and 12 miles per hour, start from the same point at the same time to sail perpetually round an island which is 55 miles in circumference. Find when the vessels will be together again after starting.

(503) A person buys 80 gallons of whisky at 10*s*. per gallon, and the same quantity of a better quality. He mixes them together, and sells the mixture at 13*s*. 6*d*. per

gallon, with a profit of 20 per cent. Find what he gave per gallon for the better quality.

(504) A cubic foot of water weighs 1000 oz. avoirdupois; what should be the length of the side of a cubical vessel which would hold a ton weight of water?

(505) A train travelling at the rate of 30 miles an hour starts at 10 o'clock A.M. from London to York. At 11.35 A.M. a second train, which travels at the rate of 40 miles per hour, starts from the same place for the same destination, and overtakes the first train on its arrival at York. Find the distance between London and York.

(506) A manufacturer sells cloth to a tradesman with a profit of 20 per cent., and the amount of the bill is £630. At the end of 3 months the tradesman becomes bankrupt, and pays 15*s.* in the £. What does the manufacturer *actually* lose by this bankruptcy, reckoning money to be worth 4 per cent. per annum?

(507) A person buys 3 houses whose values are in the proportion of 4, 3, and 2. He sells them all at once, clearing 10 per cent. by the first, 6 per cent. by the second, but losing 4 per cent. on the third. His entire gain is £101. Find the value of the houses.

(508) A invests in the 3 per cent. Consols at 95, whilst his friend B invests in £28 shares in a gas company, which pays regularly a dividend of 4½ per cent. per annum, when the shares are down at £25 each. Find which is the better investment per cent. per annum, and by how much.

(509) A grocer mixes together two kinds of tea at 3*s.* and 2*s.* per lb. respectively, in such a manner that when he sells the mixture at 3*s.* 4*d.* per lb. he gains 25 per cent. Find in what proportion he has mixed them.

(510) Find to 6 places of decimals the value of

$$2 + \frac{1}{2} + \frac{1}{2^2} + \frac{1}{2^3} + \dots$$

(511) A brick is 9 inches long, 4½ inches broad, and 3

inches thick; what length of wall, which is 10 ft. high, and 18 inches thick, could be built with 1,000,000 bricks?

(512) The 3 per cent. Consols are at 92, and the shares in the waterworks of a certain town are now at £30 each which were originally at £25 each. Find what rate per cent. per annum these shares in the waterworks should pay so as to be as good an investment as the Consols.

(513) Express $\frac{5\frac{1}{7}}{18}$ of 4*s.* 1*d.* $-$ ·365 of £1 0*s.* 10*d.* $+$ $\cdot 5\dot{9}2\dot{5}$ of £2 14*s.* as the decimal of £3.

(514) The breadth of a room is 15 ft. The carpeting of the floor with carpet 2 ft. wide and worth 3*s.* 4*d.* per yard is £8 6*s.* 8*d.*, and the papering of the four walls with paper 18 inches wide and worth 6*d.* per yard is £4 13*s.* 4*d.* Find the height of the room.

(515) A person's income, which is £522 10*s.* a year, is derived from two different mortgages of £3500 and £8500. The rate of interest on the latter sum is ½ per cent. more than on the former. Find the rates of interest.

(516) 20 bottles of brandy, which contain brandy and water in the proportion of 2 to 1, are mixed with 40 bottles of brandy, in which the brandy and the water are in the proportion of 3 to 1. Find the proportion of brandy to water in the new mixture.

(517) A cattle dealer buys a number of sheep at £2 5*s.* each. He sells $\frac{1}{10}$ of them at a loss of 5 per cent., ½ of them at a gain of 10 per cent. and the rest at a gain of 8 per cent. If he had sold the whole at a gain of 9 per cent. he would have made £29 5*s.* more than he did. Find the number of sheep that he purchased.

(518) A person invests £2640 in the 3 per cent. Consols at 88, and when they have risen to 90 he sells out and invests the proceeds in the 3½ per cent. Stock, and thus increases his annual income by £8 8*s.* 9*d.* Find the price of the 3½ per cent. Stock when he purchased.

(519) A manufacturer sells goods to a merchant at a profit of 8 per cent., who sells them again to the retail dealer for £3801 12*s.* clearing 10 per cent. by the sale. Find the cost price of the goods.

(520) A rectangular cistern, which is 4 ft. 6 in. long, and whose breadth and depth are the same, contains $28\frac{1}{8}$ cubic feet of water. Find the cost of lining the sides and bottom at 1*s.* 2*d.* per square foot.

(521) On a piece of work 3 men and 5 boys are employed who do half of it in 6 days. After this one more man and one more boy are put on, and $\frac{1}{3}$ more is done in 3 days; how many more men must be put on, that the whole may be completed in one day more?

(522) £10,000 are left to a person, and allowed to accumulate for 3 years at 5 per cent. compound interest. At the end of that time the money is invested in the 3 per cent. Consols at 92. Find what yearly income the person will receive after deducting an income tax of 5*d.* in the £.

(523) A person on going to Prussia takes with him £50 which he exchanges for Prussian money at the rate of 6 thalers and 25 silbergroschen for £1 sterling. During his stay in that country he spends 200 thalers, and on leaving he exchanges his remaining Prussian money into English money at the rate of 6 thalers and 20 silbergroschen for £1. What sum did he receive? (30 silbergroschen = 1 thaler.)

(524) In what proportion must a wine merchant mix brandy worth 18*s.* per gallon with an inferior kind at 15*s.* per gallon, and with water, so that he may be able to sell the mixture at 12*s.* per gallon?

(525) A poulterer buys a number of fowls at 2*s.* 6*d.* each, and he sells half of them at 3*s.* 2*d.* each, and the other half at a loss of 10 per cent. He gained in all 12*s.* 6*d.* Find how many he bought.

(526) How much gold which is 18 carats fine, and other gold which is 15 carats fine, and alloy which is considered

of no value, must be mixed with 16 oz. of pure gold, so that the mass may be 16 carats fine? (Pure gold is 24 carats fine.)

(527) A cattle dealer buys 100 oxen for a certain sum each, and after keeping them all for a month at the cost of 30*s*. each, he sells half of them for £26 each, with a profit of 30 per cent. upon what they originally cost him, and a quarter of them at £27 each, and the rest at £28 each. Find what he gave for them all at first, and also his entire gain.

(528) The Mint buys silver for the purpose of coining seventy-four millions eight hundred and sixty-seven thousand five hundred florins; but when three-fourths of the florins have been finished, the Mint is ordered to coin the rest of the silver into half-crowns. How many half-crowns will there be?

Cambridge Junior Paper, 1874. 528 to 540.

(529) Divide 570021 by 77 by *short* division, explaining how you obtain the remainder.

(530) The weights of Bow Bells are respectively: 2 tons 13 cwts. 25 lbs.; 1 ton 6 cwts. 13 lbs.; 1 ton 1 cwt. 23 lbs.; 16 cwts. 4 lbs.; 13 cwts. 2 qrs. 22 lbs.; 12 cwts. 7 lbs.; 10 cwts.; 9 cwts. 1 qr. 5 lbs.; 8 cwts. 3 qrs. 7 lbs.; and 1 ton 14 cwts. 2 qrs. 6 lbs. Find their total and also their average weight.

(531) Find by Practice the cost of 7 tons 15 cwts. of ball-metal at £7 16*s*. per cwt.

(532) Simplify $\frac{384}{672}$; $\dfrac{9\frac{2}{9}-7\frac{2}{7}}{\frac{61}{63}}$; and $3\frac{1}{2} \cdot\cdot 1\frac{7}{8}+4\frac{5}{12}-2\frac{11}{30}$.

(533) A and B join in giving a picnic, each paying for the guests he invites. A invites 15 and B 10. The whole cost is £6 18*s*. 6½*d*. On the day, B pays for the carriages for the whole party at 2*s*. 6*d*. per head, and A pays all the other expenses. How must they afterwards settle accounts with one another?

(534) Divide 4·05 by 2·7; 40·5 by ·0027; and ·00405 by ·00027

(535) Reduce £1 3*s*. 11¾*d*. to the decimal of £5, giving the most correct answer to 4 places of decimals.

(536) Make out a bill for the following goods, shipped to New York, together with the charges upon them: Irish linen, 475 yards at 3*s*. 4*d*. per yard. Black cloth, 37 yards at £1 0*s*. 6*d*. per yard. Charges: packing, £1 19*s*. 1*d*.; shipping, £4 7*s*. 8*d*.; insurance and commission on £130 at 2½ per cent.

(537) Find the discount at 4½ per cent. on £587 18*s*. 9*d*. due 6 months hence.

(538) If 7 oxen can eat 3 tons of hay in a month, how long will it take 49 sheep to eat 35 tons, an ox consuming three times as much as a sheep?

(539) A room measures 16 ft. by 21 ft., and is 11 ft. high. There is one door 7 ft. by 3 ft., and there are two windows, 8 ft. by 4 ft. Find the cost of papering it with paper 2 ft. wide at 2½*d*. per yard.

(540) How many poles of fencing are required to enclose a square park containing 832 ac. 2 roods 25 poles?

Cambridge Senior Paper, 1874. 541 to 552.

(541) Find the product of the sum and difference of two hundred and thirty-eight thousand four hundred and twenty-eight, and one hundred and five thousand and sixty-nine.

(542) Find by Practice the rent of a farm containing 279 acres 3 roods 36 poles at £2 11*s*. 8*d*. per acre.

(543) The circumferences of the fore and hind wheels of a carriage are 13 ft. 9 in. and 16 ft. 6 in. respectively. How far has the carriage travelled when the fore wheel has made 768 more revolutions than the hind wheel?

(544) Simplify the fraction

$$\frac{(\frac{1}{2}+\frac{2}{3}) \text{ of } (\frac{3}{4}+\frac{4}{5})+(\frac{1}{2}+\frac{3}{4}) \text{ of } (\frac{2}{3}+\frac{4}{5})+(\frac{1}{2}+\frac{4}{5}) \text{ of } (\frac{2}{3}+\frac{3}{4})}{\frac{1}{2} \text{ of } (\frac{2}{3}+\frac{3}{4}+\frac{4}{5})+(\frac{1}{2}+\frac{2}{3}+\frac{3}{4}) \text{ of } \frac{4}{5}}.$$

(545) State and prove the rule for the multiplication of decimal fractions. Multiply 253·75 by 4·027, and divide the product by ·028189.

(546) Find the value of $\cdot 3\dot{4}\dot{5}$ of 9*s.* 2*d.* + $\frac{5}{6}$ of ·075 of £10 + ·05 of 1·125 of £1 13*s.* 4*d.*, and express the result as a decimal fraction of £50.

(547) A person buys a certain number of eggs at two a penny; four times the number at 5*d.* a dozen, five times the number at 8*d.* a score, and ten times the number at 3*s.* 2$\frac{1}{3}$*d.* per hundred, and retails them at 6*d.* a dozen; what profit does he make per cent.?

(548) A décimètre is equivalent to 3·937 inches, and a cubic décimètre of water weighs one kilogramme. If a cubic inch of water weigh 252·45 grains, express a kilogramme in pounds avoirdupois, correct to within the one-thousandth part of a pound, 7000 grains being equal to one pound avoirdupois.

(549) What sum of money will amount to £699 13*s.* 2·4*d.* in 2 years, reckoning compound interest for one year at 4 per cent., and for the other at 3$\frac{1}{2}$ per cent. per annum?

(550) A man saves every year £150, and invests it at the end of the year at 5 per cent. compound interest. Find the amount of his savings at the end of the fourth year.

(551) The area of a square cricket-field is 9 acres 3 roods 8·16 poles. A running path of the uniform width of 3·9 yards is constructed close to the boundary of the field, at a cost of 4*d.* per square yard, and the remainder of the field is laid down in turf at a cost of 5*s.* 6*d.* per 100 square yards. Find the total cost of preparing the field.

(552) A person having a certain sum of money to invest, finds that an investment in a railway preference 5 per cent. Stock at 117$\frac{1}{2}$ will yield him £27 more interest annually than an investment in the 3 per cent. Consols at 92$\frac{1}{4}$. How much money has he to invest?

(553) If the French pay off their debt at the rate of thirty-eight million four hundred and sixty-three thousand two hundred and fifty francs a year, how much will they have paid in thirteen years? If this be at the

Cambridge
Junior
Paper,
1875.
553 to 566.

rate of fourteen francs a year for each person, what is the population?

Write the answers in words as well as in figures.

(554) An innkeeper buys 10 gallons of spirits at 12*s.* per gallon, 15 at 4*s.* 6*d.*, and 18 at 5*s.* 9*d.* How must he sell the mixture per gallon that he may gain £2 2*s.* 3*d.* on his outlay?

(555) Simplify the expression

$$\frac{\frac{1}{2}+\frac{1}{3}+\frac{1}{4}}{\frac{2}{5}+\frac{2}{7}+\frac{2}{9}}$$

and reduce to its simplest form

$$3\tfrac{1}{125} \text{ of } 3\tfrac{4}{7} \div (\tfrac{47}{345} \text{ of } 9).$$

(556) Find the value of ·775625 of £5; and reduce 2 qrs. 21 lbs. to the decimal of a ton.

(557) A body of 50000 soldiers is to be raised in 4 provinces, which contain respectively 175002, 82434, 22116, and 20448 men fit for service. Find the number which each must supply.

(558) Define the terms *interest*, *discount*, *present worth*. Find the simple interest on £281 12*s.* at 3½ per cent. per annum for 4 years and 2 months.

(559) If 15 horses and 148 sheep can be kept for 9 days for £75 15*s.*, what sum will keep 10 horses and 132 sheep for 8 days, supposing 5 horses eat as much as 84 sheep?

(560) A silver tankard weighs 41 ozs. troy. What is its avoirdupois weight, assuming that the pound avoirdupois contains 7000 grains troy?

(561) Find by practice the cost of 27 cwt. 3 qrs. 6 lbs. of metal at £22 8*s.* per cwt.

(562) State the rules for the multiplication and division of decimals. Divide 12·6 by ·0012, and ·065341 by ·00475.

(563) A goods train is 8 miles ahead of an express train which travels at the rate of a mile in 1¼ minute. It is run into in 20 minutes. At what rate per hour was the goods train running?

(564) By selling a carriage for £73 3*s.* I should lose 5 per cent. At what price must I sell it to gain 15 per cent.?

(565) Which is the better investment—French 3 per cent. at $64\frac{1}{2}$, or United States 5 per cent. at $102\frac{3}{4}$? Calculate the difference of income produced by an investment of £1000 in each.

(566) A rectangular court is 120 feet long and 90 feet broad, and a path of the uniform width of 10 feet runs round it. Find the cost of covering the path with flag stones at 4*s.* 6*d.* per square yard, and the remainder of the court with turf at 6*s.* 6*d.* per 100 square feet.

Cambridge Senior Paper, 1875. 567 to 578.

(567) Multiply six hundred and eight thousand eight hundred and seventy-two by sixty-nine, and divide the product by ninety-two.

(568) A man laid out £12 18*s.* 8*d.* in gloves at 2*s.* 8*d.* the pair; some of them faded and were unsaleable: the rest he sold for £14 13*s.* 10*d.* at 3*s.* 5*d.* the pair. How many pairs faded?

(569) What is the price of a silver bowl weighing 5 lbs. 8 oz. 9 dwts. at 5*s.* 10*d.* per oz.?

(570) Reduce $\frac{4844}{5536}$, $\frac{7623}{8316}$ to their lowest terms, and then divide their sum by $1\frac{19}{24}$.

(571) Convert $3\cdot064\dot{8}1\dot{4}$ into a vulgar fraction in its lowest terms, and divide 5·5811 by ·067.

(572) Express $\frac{13}{29}$ of $\frac{8}{39}$ of 9 days 16 hours + ·0390625 of 10 days 16 hours as the decimal of $23\frac{1}{2}$ days.

(573) A man bought 240 cows at Rotterdam, paying £14 6*s.* for each; their carriage to London cost $\frac{1}{22}$ of his outlay; he then exchanged them for 299 ponies which he sold for £15 per head. What did he gain per cent. on his expenditure?

(574) If 4 men earn as much in a day as 7 women, and one woman as much as 2 boys, and if 6 men, 10 women, and 14 boys working together for 8 days earn £22, what will be the earnings of 8 men and 6 women working together for 10 days?

(575) A debt of £65 is paid in francs valued at 9¾*d.* each, at a time when 25 francs are worth £1. What does a creditor gain or lose?

(576) Find the true discount on a bill for £397 2*s.* due half a year hence at 5 per cent. per annum.

(577) A person travelled from London to Loch Lomond (480 miles) by sea, rail, and coach. The distance by coach was $\frac{1}{3}$ that by rail, and the distance by rail $\frac{3}{20}$ that by sea; the cost of the journey by coach was $\frac{2}{3}$ that by rail; the cost by rail was $\frac{3}{10}$ that by sea. How much did the whole journey cost him, coach fare being 4*d.* per mile?

(578) A person has a certain capital, half of which he invests in the 3 per cent. at 90, and the other half in the 5 per cent. at 110. What was his capital, if his total income (from both sources) is £6883 10*s.*?

(579) A railway is 1572 miles long. Find the number of bolts required to fix the chairs for the rails upon the sleepers, there being 2 bolts to each chair, 2 chairs to each sleeper, and 2 sleepers upon an average to every 22 inches of the whole length of the railway. Express the answer in words.

Cambridge Junior Paper, 1876. 579 to 591.

(580) Reduce 20 tons 15 cwts. 1 oz. to ounces, and 189550 half-guineas to half-crowns.

(581) Multiply £13 15*s.* 2¾*d.* by 35, and divide £810 15*s.* 7½*d.* by 59.

(582) Find by *Practice* the cost of 5 yds. 22½ in. at £2 1*s.* 2*d.* per yard.

(583) Explain the principle of what is commonly called the Single Rule of Three, and find by this rule how much in the £ a bankrupt pays if his creditors receive £188 2*s.* 9*d.* out of £6228.

(584) If I save £40 10*s.* out of every £150 I receive, and in 60 years I thus save £8505, how much have I spent per day during that period, supposing every year to have 365 days?

(585) Reduce to its lowest terms $\frac{100110}{31866}$. Find the value of $(2\frac{1}{2}+\frac{1}{6})\div(3\frac{2}{3}-\frac{1}{8})$, and of $\frac{4\frac{1}{7}-2\frac{1}{4}}{6\frac{1}{2}-2\frac{1}{7}}$.

(586) How much less time will it take for light to pass from the Sun to Jupiter, if it travels 186000 miles per second, than if it travels 185000 miles per second, given that the earth is 91,760,000 miles from the Sun, and Jupiter $5\frac{1}{4}$ times as far?

(587) Reduce $\frac{3}{5}$ of 21*s.* to the decimal of £1. Add $9{\cdot}94\dot{6}+{\cdot}0\dot{3}\dot{4}+12{\cdot}\dot{3}$, without reducing the decimals to their equivalent vulgar fractions.

(588) A room is 20 yds. 1 ft. 6 in. long, 15 yds. 1 ft. 6 in. wide, and 17 ft. 6 in. high; how much will it cost to paper it with paper $\frac{3}{4}$ of a yard wide at $2\frac{1}{4}$*d.* per yard?

(589) At what rate per cent. per annum will a given sum of money double itself at simple interest in 30 years?

Find the amount of £512 for 3 years at $6\frac{1}{4}$ per cent. compound interest.

(590) If I buy equal numbers of pins at $1\frac{1}{2}$*d.* and at $2\frac{3}{5}$*d.* per 1000 and mix them together, at what price must I sell an ounce of pins thus mixed so as to gain 25 per cent. profit on my outlay, supposing either 2000 of the first kind or 1250 of the second kind weigh an ounce?

(591) Find the square root of 576·4801.

Cambridge
Senior
Paper,
1876.
592 to 605.

(592) Add together—thirty-seven millions six hundred and twenty-nine thousand and seventy-three; eight millions two thousand and six; five millions seven hundred and four. From the sum subtract twenty-nine millions fifty thousand six hundred and eleven, and divide the remainder by 18.

(593) Find by *Practice* the value of 128 tons 15 cwts. 3 qrs. 24 lbs. of iron at £16 6*s.* 8*d.* per ton.

(594) Simplify

$$\frac{1\frac{1}{2}}{8\frac{1}{2}} \text{ of } \frac{1\frac{1}{2}+1\frac{1}{3}}{2\frac{2}{3}-1\frac{1}{6}}+\frac{2\frac{1}{5}+4\frac{1}{3}}{1\frac{1}{5}-\frac{1}{9}} \text{ of } \frac{1}{9}.$$

(595) A mètre is defined to be $\frac{1}{10000000}$ of the one-fourth part of the circumference of the earth, and is equal to 39·37079 inches; find the circumference of the earth in miles.

(596) Express as vulgar fractions ·01875, $\cdot 24\dot{9}$, and $\cdot 124\dot{9}$; and explain the results obtained in the last two examples.

(597) Express the difference between $\cdot\dot{3}7\dot{8}$ of 13*s.* 10½*d.* and $\cdot 3\dot{7}\dot{8}$ of 16*s.* 6*d.* as a fraction of $\cdot 42\dot{6}$ of £1 17*s.* 6*d.*

(598) State the rule for the division of decimal fractions.

Divide 85·9625 by 26·45, and by ·02645. Also divide $31\cdot\dot{6}$ by $\cdot 04\dot{2}$ without reducing the decimals to their equivalent vulgar fractions.

(599) The *Times* issued this morning (Tuesday, December 12, 1876) is numbered 28810; find the number of the first copy of the *Times* which was published in the year 1876.

(600) The area of a square field is 3 ac. 1 rood 38 poles 20¼ sq. yds.: find the size of a rectangular field whose length and breadth exceed a side of the square field by 390 and 65 yards respectively.

(601) Explain the meaning of the term Present Worth of a Bill. If the true discount on a bill discounted at 4¼ per cent. per annum 4½ months before it is due, be £11 13*s.* 9*d.*, what is the amount of the bill?

(602) If the cost of the carriage of goods in England be 1*d.* per ton per mile, find the equivalent cost of carriage in France in centimes per 1000 kilogrammes per kilomètre, assuming that a kilomètre is equal to 5 furlongs, a kilogramme to 2·2 lbs., and 100 centimes to one-twenty-fifth of a pound sterling.

(603) If 3 men, 4 women, and 5 children can reap a field of 9 acres 2 roods in 6 days, working 10 hours a day, in what time can 7 men, 6 women, and 11 children reap a field of 14 acres 1 rood, working 12 hours a day, suppos-

ing the work done by a man, woman, and child to be in the ratio 3 : 2 : 1 ?

(604) A grocer has a quantity of tea which he must sell at the rate of 3*s.* 6*d.* per lb. to gain 40 per cent. If he mixes it with tea which costs him 2*s.* 3*d.* per lb. in the ratio of 7 lbs. of the former to 3 lbs. of the latter and sells the mixture in 10 lb. packets at £1 12*s.* 4*d.*; how much does he gain per cent. ?

(605) An investment of £7440 is made in the 3 per cent. Consols at 92$\frac{7}{8}$ two months before the half-yearly dividend is paid. Immediately after the receipt of this dividend the stock is sold out at 92. If a brokerage of $\frac{1}{8}$ per cent. is paid both on the purchase and sale, find the rate of interest per cent. per annum obtained by the investor on this transaction.

Oxford Junior Paper, 1875. 606 to 618. Preliminary.

(606) Multiply one hundred million one hundred thousand and ten by five thousand and five; and divide five hundred and one million five hundred by three thousand eight hundred and fifty.

(607) Goods were bought for £560 15*s.* 6*d.*: there was further paid for packing £1 10*s.*; for carriage £12 6*s.* 8$\frac{1}{2}$*d.*; and for import duty £3 8*s.* 6$\frac{3}{4}$*d.* The goods were then sold for £655 8*s.* 5*d.* What was the profit on the transaction ?

(608) The profits of a business, amounting to £904 11*s.* 4*d.*, are divided equally among the partners. If each receives £56 10*s.* 8$\frac{1}{2}$*d.*, what is the number of the partners ?

(609) How many grains of gold are there in a cup weighing 8 oz. 4 dwts. ?

(610) What is a quarter's rent of 350 acres of land, if £11 5*s.* 9*d.* per annum be given for 9 acres ?

(611) What is the value of 13 cwt. 3 qrs. 4 lbs. at £2 18*s.* 4*d.* per cwt. ?

(612) Add together $\frac{1}{8}$ of a guinea, $\frac{5}{8}$ of a pound, and $\frac{7}{8}$ of a shilling; and reduce a farthing to the fraction of a guinea.

(613) What length of time is represented by ·58 of a year?

(614) A coach travels $7\frac{1}{2}$ miles an hour: how far will it have gone between 10.15 A.M. and 5.45 P.M.?

Extra. (615) Simplify $\frac{6}{7}+\frac{7\frac{3}{4}-6\frac{1}{2}}{2\frac{1}{3}\times 9}$; and divide 33 yards 0 ft. 8 in. by $13\frac{1}{7}$.

(616) Divide ·0096 by 1·2; and express 7*s.* 2*d.* as the decimal of £3 15*s.* 9*d.*

(617) If a family of 7 persons can live on £140 for 28 weeks, how long can a family of 9 persons live on £135?

(618) Find the simple interest upon £41 13*s.* 4*d.* for 8 months at $4\frac{1}{2}$ per cent. per annum.

(619) Find the G.C.M. of 5568981, and 506382; and the L.C.M. of 32, 48, 40, 14.

Oxford Senior Paper, 1875. 619 to 626.

(620) Simplify $\frac{1\frac{2}{3}\text{ of }1\frac{1}{4}}{3\frac{2}{5}+\frac{5}{1\frac{19}{41}}}+\frac{4}{5+\frac{6}{7+\frac{8}{9}}}$.

(621) Give a rule for the division of decimals, and divide 12·5 by ·0025, and $4{\cdot}2\dot{6}$ by $\cdot 7\dot{3}$, expressing the latter result as a decimal.

(622) Find what length of paper 14 inches wide will cover the walls of a room 15 feet long, 13 feet broad, and 10 feet high; and find the cost if the paper is sold at three-halfpence a foot.

(623) Find the square roots of 11854249 and $1{\cdot}\dot{7}$.

(624) A merchant buys a fifty gallon cask of wine for £62 10*s.*, and sells it at 26*s.* per gallon; what is his gain per cent.?

(625) If the wages of 4 men for 12 days be £6, what would be the wages of 6 men for 10 days?

(626) How much $3\frac{1}{2}$ per cent. stock at $97\frac{3}{4}$ can be purchased for £3519, and what income would be thence derived?

Oxford Junior Paper, 1876. 627 to 639. Preliminary.

(627) Subtract eight million nine hundred thousand one hundred and thirty from nine million and seven; and express the result in words.

(628) Multiply 5009 by 410.

(629) Divide 10814220 by 876.

(630) Add together £16 17*s.* $8\frac{1}{4}$*d.*, £202 15*s.* $6\frac{1}{2}$*d.*, £77 17*s.* 9*d.*, and £35 12*s.* $3\frac{3}{4}$*d.*

(631) How many square yards are there in 75 acres 2 roods and 32 perches?

(632) If £3 10*s.* be received for 18 weeks' service, how long will it take to earn £8 15*s.*?

(633) Find by *Practice* the cost of 18 gals. 2 qts. 1 pt., if £1 6*s.* 4*d.* be paid for a gallon.

(634) Reduce $\frac{3}{4}$ of a yard to the fraction of a mile.

(635) A person's payment for a tax which is levied at the rate of 5*d.* in each pound of his income amounts to £13 17*s.* 6*d.* What is the amount of income on which the tax is paid?

Extra. (636) Simplify:

$$(1)\quad \left(4\tfrac{1}{5} \text{ of } 1\tfrac{1}{14} \text{ of } \tfrac{2}{11}\right) \times \frac{1\frac{5}{8} - \frac{1}{4}}{3 \times \frac{3}{8}};$$

$$(2)\quad \frac{\frac{1}{2} + \frac{1}{3} - \frac{1}{4}}{\frac{1}{3} + \frac{1}{4} - \frac{1}{5}} \div 1\tfrac{1}{2}\tfrac{2}{3}.$$

(637) A room is a perfect cube, each wall being 15 feet in height, and 15 ft. in breadth; there is a door 6 ft. high and 4 ft. wide, and a window 7 ft. high and 3 ft. wide; find the cost of papering the walls with paper 1 yd. wide, at 1*s.* 2*d.* a yard.

(638) Divide 1·1 by ·0001 and by 1000; and reduce 6*s.* 4*d.* to the decimal of £3 6*s.* 8*d.*

(639) Find the compound interest on £104 for 1 year 9 months at 5 per cent. per annum.

Oxford Senior Paper, 1876. 640 to 647.

(640) Find the G.C.M. of 15463 and 554470; and the L.C.M. of 11, 30, 42, 66, 90.

(641) Express the product of $\cdot\dot{3}$ and $\cdot\dot{0}2\dot{1}$ in recurring decimals; and divide 39 by ·013, and ·00341734 by 1·0051.

(642) Find by *Practice* the cost of 17 cwt. 3 qrs. 22 lbs., at the rate of £4 6*s.* $7\frac{1}{2}$*d.* per cwt.

(643) Find the value of $\frac{2}{15}$ of a guinea $+ 5\frac{5}{9}$ of 8*s.* 9*d.* $-\frac{8}{7}$ of half-a-crown.

(644) How many days of 12 hours each would 100 men take to perform a piece of work in, when 45 men can do the same in 16 days of 10 hours each?

(645) Extract the square root of 8538084; and also that of 3, to five places of decimals.

(646) *A* invests £1695 16*s.* 8*d.* in the $3\frac{1}{2}$ per cents. at $101\frac{3}{4}$, and *B* a sum of £1767 3*s.* 9*d.* in the 3 per cents. at $94\frac{1}{4}$. What is the difference between their respective incomes thence derived?

(647) What sum put out at $3\frac{1}{2}$ per cent. per annum simple interest will amount to £323 6*s.* $10\frac{1}{2}$*d.* in $7\frac{1}{7}$ years?

Cambridge Higher Local Paper, 1875. 648 to 660. Part I.

(648) Find the sum and difference of seven hundred and eighty-three millions five thousand three hundred and nine, and five hundred and four millions twenty-nine thousand and seven.

(649) Divide 570326 by 63 by short division, explaining clearly the formation of the remainder.

(650) Find by *Practice* the rent of a farm containing 480 acres 3 roods 17 poles at £3 8*s.* 4*d.* per acre.

(651) Reduce to their simplest forms

$$\frac{12}{19}\left(\frac{2}{3}+\frac{3}{4}+\frac{5}{9}-\!\!-\left(\frac{1\frac{2}{3}}{1\frac{1}{3}} \text{ of } \frac{1\frac{1}{2}}{5}\div\frac{3}{2\frac{2}{3}},\right.\right.$$

and
$$\left(\frac{5}{6}+\frac{7}{8}\right) \text{ of } \frac{8}{9}+\left(\frac{5}{6}+\frac{8}{9}\right) \text{ of } \frac{7}{8}+\left(\frac{7}{8}+\frac{8}{9}\right) \text{ of } \frac{5}{6}.$$

(652) Add together $\frac{7}{20}$ of 2 tons, $\frac{6}{7}$ of 1 ton 15 cwt., $\frac{1}{63}$ of 1 cwt. 2 qr. 21 lbs., $\frac{5}{9}$ of 1 qr. 17 lbs., and express the result as a vulgar fraction of 10 tons.

(653) State the rules for the multiplication and division of decimal fractions. Multiply 1·0125 by 6·096, and divide ·00017 by 6·4 and 3·1 by ·0025.

(654) Explain the meaning of the terms Discount and Present Worth of a Bill.

Find the present worth of a bill for £1224 15*s.* due 5½ months hence, discounted at 4½ per cent. per annum, simple interest.

Part II. (655) Find the value of

·38̇4̇ of £1 7*s.* 9*d.*+·38̇4̇ of £1 7*s.* 6*d.*+·384 of £1 17*s.* 6*d.*, and express the result as a decimal of £10.

(656) Find the compound interest on £1200 for 2 years at 5 per cent. per annum, interest being payable half-yearly.

(657) Assuming that a pound avoirdupois contains 7000 grains, find the percentage of error in the statement that 1 oz. Troy is equivalent to 1·1 oz. avoirdupois.

A silver tankard is sold at the rate of £2 5*s.* per oz. Troy. No Troy weights being accessible, it is weighed and found to weigh 44 oz. avoirdupois, and its Troy weight is calculated by the above rule. How much does the purchaser gain or lose by this mode of estimating its weight?

(658) A square field contains 22 acres 2 roods. How long will it take a person to run round the boundary of it, running at the rate of 12 miles an hour? If the field be increased by 9 acres, so as to form a rectangle whose breadth is the side of the square, at what rate is a person running who runs round its boundary in 1 min. 39 sec. more than was occupied in running round the square field?

(659) A grocer has two kinds of tea. By selling the first at 3*s.* 9*d.* per lb. he gains 25 per cent. and by selling

the second at 3*s*. 6*d*. per lb. he gains 40 per cent. If he mix them in equal quantities and sell the mixture at 3*s*. 7½*d*. per lb., find his gain per cent.

(660) A person derives an income of £253 10*s*. from an investment in the 3 per cent. Consols. He sells out when they are at 93⅞, and invests the proceeds in Brazilian 5 per cents. at 97½. Find the increase of his income.

(661) A man has in his purse £25. How much has he left after paying five bills amounting to £3 17*s*. 11½*d*., £5 18*s*. 9*d*., £2 1*s*. 8½*d*., £7 11*s*. 10*d*., and two guineas ?

Cambridge Higher Local Paper, 1876. 661 to 672. Part I.

(662) Find the smallest integral number of pounds, which can be divided into an equal number of guineas, sovereigns, half-sovereigns, crowns, half-crowns, florins, shillings, sixpences, and fourpenny pieces.

(663) Find by *Practice* the value of a bar of pure gold weighing 5 lbs. 10 ozs. 17 dwts. 22 grs. at £4 5*s*. per oz.

(664) Define a vulgar fraction, and show that $\frac{2}{3}=\frac{6}{9}$.

Reduce to its simplest form

$$\left(\frac{1}{2}+\frac{2}{3}\right) \text{ of } \left(\frac{3}{4}+\frac{4}{5}\right)+\frac{5}{6} \text{ of } \left(\frac{1}{8}+\frac{1}{10}\right)+\left(\frac{1\frac{1}{2}}{22\frac{1}{2}}\div\frac{21\frac{1}{3}}{1\frac{1}{3}}\right).$$

(665) State and prove the rule for the multiplication of decimals.

Multiply 36·2 by ·075, and divide 57·528 by 3·76, and 5752·8 by ·00376.

(666) Find the value of $1\frac{1}{7}$ of £1 15*s*. $+\frac{6}{11}$ of £1 7*s*. 6*d*. $+\frac{5}{23}$ of £3 1*s*. 4*d*. $+\frac{2}{3}$ of $1\cdot\dot{3}$ of £5 1*s*. 3*d*., and express the result as a fraction of £9 10*s*.

(667) Find the amount of £1035 at the end of 10½ months at 4 per cent. per annum simple interest.

Find also the present worth of a bill for £1035, due 10½ months hence, at the same rate of interest.

Part II.

(668) Silver of the ordinary standard contains 92·5 per cent. of pure silver, and silver of the Britannia standard contains 11 oz. 10 dwts. of pure silver to the pound Troy. Find the weight of pure silver in two bars of the ordinary and Britannia standards weighing respectively 55 lbs. 9 oz. 8 dwts. 8 grs., and 91 lbs. 7 oz. 1 dwt.

(669) A mètre is 39·3708 inches, and a hectare is 10000 square mètres. Express a hectare in acres correct to three decimal places.

(670) *A* and *B* ride a race of 50 miles on bicycles. The wheel of *A*'s bicycle makes 3 revolutions in 2 seconds, and that of *B* 960 revolutions in 10 minutes 15 seconds. *A* accomplishes the distance in 3 hours 20 minutes, and wins by 5 minutes. Find the circumference of the wheel of each bicycle.

(671) A man has £12000 to invest. He invests $\frac{1}{3}$ of this sum in the 3 per cent. Consols at 96, $\frac{7}{24}$ in railway debenture 4 per cent. stock at 105, and the remainder in French 3 per cent. Rentes at 67½. Find his whole income, and the average rate of interest he makes on his investments.

Find also the increase in his capital, when each stock has risen 1 per cent.

(672) A proprietor of railway stock received last year a dividend of 6½ per cent. on his stock, and paid an income tax of 2*d.* in the pound. This year the dividends have fallen to 6 per cent., and the income tax is increased a 1*d.* in the pound, and his net income is reduced by £125. Find the amount of stock which he holds.

Oxford and Cambridge Schools Exam. 1876. 673 to 682.

(673) Multiply two millions two hundred and one by ten thousand one hundred, and find by what number 2765 must be divided in order that the quotient may be 32 and the remainder 13.

(674) Subtract $\frac{5}{6}$ from $\frac{6}{7}$, $\frac{6}{7}$ from $\frac{7}{8}$, and $\frac{7}{8}$ from $1\frac{1}{9}$, and add together the results.

Find the G.C.M. of 286720 and 1310309,

(675) Find the value of $\frac{5}{9}$ of a guinea + $\frac{3}{16}$ of £1 + $\frac{7}{10}$ of a crown + $\frac{5}{8}$ of a shilling; and express 19*s*. 8¼*d*. as a fraction of £5 10*s*.

(676) The price of gold being £3 17*s*. 10½*d*. an ounce, find the weight of a nugget worth £341·0925.

(677) Simplify

$$\frac{2}{8+\dfrac{\cdot 2}{3+\dfrac{\cdot 02}{3\cdot 002}}};$$

and subtract $\cdot 85416\dot{6}$ of 10*s*. from $\cdot 11\dot{7}\dot{2}$ of £13 15*s*.

(678) A hollow rectangular vessel, without lid, formed of material one inch thick, whose external dimensions are 13 ft. 6 in., 6 ft. 8 in. and 6 ft. 11 in., respectively, weighs 1 cwt. 1 qr. 10 lbs. Find the weight of a solid mass of the same material and the same dimensions.

(679) Find the value in English money of 1572·4185 francs when the exchange is at 26·675 francs per £.

(680) Egyptian 7 per cents. being at 40, in how many years' time might the debt be repudiated without loss to an investor, reckoning only simple interest, and considering the interest on safe investments to be 4 per cent.?

(681) A person holding £2450 3 per cent. consols, sells out at 93½ and invests the proceeds in Russian 4½ per cents., whereby his income is increased by £31 13*s*. 9*d*.

At what price does he buy the Russian stock?

(682) If the manufacturer makes a profit of 20 per cent., the wholesale dealer a profit of 25 per cent., and the shopkeeper a profit of 40 per cent., what was the cost of the manufacture of an article bought at a shop for 17*s*. 6*d*.?

(683) Express the number 2300025015 in words: and write in figures the sum of ninety thousand nine hundred, and nine millions and nine.

Oxford Junior Paper, 1877. 683 to 694. Preliminary.

(684) If out of £52 I pay away £25 16*s*. 1¾*d*., £2 17*s*. 11½*d*., £9 5*s*. 3½*d*. and 7*s*. 7½*d*., how much shall I have left?

(685) Divide £34161 17*s*. 11*d*. by 2705.

(686) A truck is loaded with 120 sacks; each sack weighs 7 lbs. 10 oz., and contains 84 lbs. of grain: what is the weight of the whole load in tons, cwts., qrs., lbs.?

(687) Add together $\frac{1}{2}$, $\frac{1}{3}$, $\frac{1}{8}$, $\frac{1}{24}$: from $1\frac{1}{4}$ of $4\frac{1}{6}$ subtract $2\frac{1}{12}$ of $2\frac{1}{10}$.

(688) Reduce $\frac{6}{125}$, $\frac{11}{24}$ to decimals; also ·15625, $\cdot 002\dot{6}$ to vulgar fractions.

(689) Divide 17·5 by ·125, by 5, and by 25000.

(690) When an income of £1150 is reduced by taxation to £1063 15*s.*, what is the income of a person who has £518 left after deducting the taxes?

Extra. (691) Simplify:

$$\left\{\frac{1}{2-\dfrac{3}{4-\frac{5}{6}}}-\frac{1}{2+\dfrac{3}{4+\frac{5}{6}}}\right\}\times 10\tfrac{5}{9}.$$

(692) If five men dig a trench in $1\frac{1}{3}$ day working $4\frac{1}{2}$ hours a day, how long would one man take to dig a trench half as large again working 5 hours a day?

(693) How often is ·125 of £1 contained in 17·5 of 1*s.*?

(694) I hold 10000 pounds of stock in the three per cents.; I sell out at $94\frac{1}{2}$ and invest the purchase money in four per cent. railway debentures at 105; what change do I make in my income?

(695) Simplify:

Oxford Senior Paper, 1877. 695 to 702.

$$1\tfrac{1}{11}-\frac{1-\frac{7}{22}}{2-\frac{1}{3}}+\frac{1\frac{2}{5}}{3\frac{1}{2}}-\frac{5\frac{5}{8}}{6\frac{1}{4}}\text{ of }\left(\tfrac{1}{5}-\frac{\frac{1}{2}-\frac{1}{3}}{4\frac{3}{4}-3\frac{2}{9}}\right).$$

(696) Find the L.C.M. of 125, 136, 180, 24, and 27; and the G.C.M. of 23760 and 26136.

(697) A postman whose pay for a week is 15*s.* is fined 1*s.* 6*d.* if he comes in late, and at the end of 13 weeks he receives £8 15*s.* 6*d.*; how often was he late?

(698) Divide 1028·5 by ·0017, and ·775 of £5 by ·01024 of 1*s.* $11\frac{1}{4}$*d.*

(699) Find the square root of

(i) 998001; (ii) $27\frac{54}{361}$.

(700) I sell £43400 stock out of the three per cents. at

96, and I buy six per cent. debenture stock at 105; find the difference in my annual income.

(701) If 15 men build a wall 25 yds. long 2 yds. high 2 ft. thick in 14 days, in what time will 7 men build a wall 30 yds. long 7 ft. high and 1 ft. thick?

(702) What sum put out to interest for $7\frac{1}{2}$ years at 5 per cent. simple interest will amount to £124 13*s.* 4*d.*?

Cambridge Junior Paper, 1877. 703 to 714.

(703) In building a viaduct of one hundred and one arches, ninety thousand and nine bricks are used for each arch. How many bricks are used altogether? Express the answer in words.

(704) How many times is 2 cwt. 2 oz. contained in 6 tons 8 cwt. 8 lbs.?

How many sovereigns are equivalent to 8340 guineas?

(705) Multiply 19*s.* $11\frac{3}{4}$*d.* by 311.

Divide 8 miles 3 furlongs 25 poles 3 yds. 1 ft. 6 in. by 6.

(706) Find by *Practice* the cost of 2 cwt. 1 qr. 20 lbs. 4 oz. at £1 17*s.* 4*d.* per quarter.

(707) Find the greatest common measure of 40457 and 420325.

Resolve the numbers 18, 16, 36, 44, 45, 48, 63, 121 into their simplest possible factors, and find their least common multiple.

(708) Find the value of $3\frac{1}{2}+2\frac{1}{12}+3\frac{3}{16}-7\frac{19}{24}$; also of

$$\frac{2\frac{1}{9}-1\frac{1}{8}}{7\frac{1}{2}-6\frac{2}{3}+\frac{11}{72}}$$

(709) Divide (without using vulgar fractions) ·0082 by 41; 41 by ·0082; ·0205 by ·164.

(710) Find the value of ·0375 of £3 10*s.*

Reduce $\cdot 03\dot{2}\dot{8}$ to a vulgar fraction.

(711) If 20 men can build a wall 800 ft. long, 10 ft. high, and 18 inches thick in 14 days, working 8 hours a day; how thick a wall could 15 men build 900 ft. long and 15 ft. high in 21 days, working 9 hours a day?

(712) In 2 years £250 put out to simple interest becomes £302 10*s.* What is the rate per cent. per annum?

(713) A, B, and C rent a field jointly for £25 12*s*. 5*d*. A puts in 15 sheep for 6 months, B 45 sheep for 8 months, C 81 sheep for 4 months; what should they each pay towards the rent?

(714) A rectangular grass plot measures 320 yards by 160 yards; all round it is a gravel path 6 ft. broad. The price for making the grass plot is 6*d*. per square yard; what must be the price for the gravel path per square yard, that the path may cost £1183 4*s*. less than the grass plot?

Cambridge Senior Paper, 1877. 715 to 726.

(715) Seven millions two hundred thousand penny stamps, and nine millions four hundred and six thousand halfpenny stamps, were issued in a year; what is their value in pounds, shillings, and pence?

(716) Find the value by *Practice* of 157 miles 3 furlongs 24 poles of telegraph wire at £11 10*s*. per mile.

(717) Prove that if the numerator and denominator of a fraction be divided by the same number, the value of the fraction is not altered.

Reduce $\frac{595}{1071}$, $\frac{1547}{5712}$ to their lowest terms, and express their difference as a decimal.

(718) Simplify:

$$\frac{\frac{1}{4}+\frac{11}{13}}{\frac{2}{7}+\frac{9}{11}} \div \frac{\frac{1}{5}+\frac{3}{4}}{\frac{1}{3}+\frac{2}{7}}.$$

(719) Give a general rule for the division of decimals.

The weight of a cubic inch of water is 253·17 grains, that of a cubic inch of air ·31 grains; find to 3 places of decimals, how many cubic inches of water are equal in weight to one cubic foot of air.

(720) If $\frac{7}{15}$ of a guinea be taken from $\frac{3}{12}$ of $\frac{5}{9}$ of £5; what fraction of £3 9*s*. will remain?

(721) Find the value of

$$\cdot 3\dot{8}\dot{7} \text{ of } £8\ 16s.\ 3d. + 6\tfrac{1}{2} \text{ of } \tfrac{16}{65} \text{ of } 7s.\ 8\tfrac{1}{2}d. + \tfrac{7}{11} \text{ of } 1d.$$

(722) What is the length of the edge of a cubical cistern which contains as much as a rectangular one whose edges are 154 ft. 11 in., 70 ft. 7 in., and 53 ft. 1 in.?

(723) In 1861 three towns had populations of 17650, 19600, and 18760 respectively. In 1871 the population of the first had decreased 18 per cent., that of the second had increased 21 per cent., while the population of the three had increased by 4691; find the change per cent. in the population of the third town.

(724) What sum will amount to £1591 13*s*. 2·16*d*. in 3 years at compound interest, the interest for the 1st, 2nd, and 3rd years being 3, 2, and 1 per cent. respectively?

(725) A bankrupt has goods worth £975, and had they realised their full value, his creditors would have received 16*s*. 3*d*. in the pound; but $\frac{3}{5}$ were sold at 17·5 per cent. and the remainder at 23·75 per cent. below their value. What sum did the goods fetch, and what dividend was paid?

(726) A man has stock in the 3 per cents. which brings him £240 a year. He sells out $\frac{1}{4}$ of the stock at 87$\frac{1}{4}$ and invests the proceeds in railway stock at 174$\frac{1}{2}$. What dividend per cent. per annum ought the railway stock to pay, so that he may increase his income £40 per annum by the transaction?

(727) Multiply three millions one hundred and nine by ten thousand and one, and find by what number 27658 must be divided in order that the quotient may be 285 and the remainder 13.

Cambridge Higher Local Paper, 1877. 727 to 738. Part I.

(728) A farmer sells 24 sheep at £1 9*s*. 2*d*. per head and 20 at £1 12*s*. 6*d*.; how many can he buy with the proceeds at £1 13*s*. 9*d*. each?

(729) The distance from Dover to Calais is 1271160 in., from Folkestone to Boulogne 9280 poles; which is the greater and by how much?

(730) Reduce $\frac{1645}{2115}$, $\frac{2387}{2604}$ to lowest terms, and find their difference.

Also divide ·0437 by 11·4.

(731) The price of gold being £3 16*s*. 9*d*. per ounce, find the weight of a nugget worth £283·7875.

(732) Express $\frac{4}{13}$ of $\frac{9}{85}$ of $2\frac{5}{6}$ of 7*s.* 7*d.* + $\cdot 04\dot{3}$ of 15*s.* 6*d.* as the decimal of £41 3*s.*

(733) Which, and by how much, is the greater, the simple interest on £540 10*s.* for $3\frac{1}{2}$ years at $4\frac{1}{2}$ per cent., or on £270 6*s.* for $6\frac{3}{4}$ years at $4\frac{2}{3}$ per cent.?

Part II. (734) Simplify

$$\frac{\frac{22}{31}+\frac{3}{29}}{\frac{34}{41}+\frac{5}{19}} \div \frac{\frac{21}{37}+\frac{8}{23}}{\frac{20}{43}+\frac{13}{17}}.$$

(735) If 11 men working 10 hours a day earned $643\frac{1}{2}$ francs in 13 days, how many days would 25 men working 9 hours a day be in earning 2673 francs when the pay for an hour's work had increased 20 per cent.?

(736) A man embarks his property in four successive ventures. In the first he clears 100 per cent., and in each of the others he loses 20 per cent. What percentage of profit remains to him on his original capital?

(737) A person has stock in the 3 per cents. which brings him £240 a year. He sells out one-fourth of the stock at $87\frac{1}{4}$, and invests the proceeds in railway stock, when a £100 share is worth £$174\frac{1}{2}$. What dividend per cent. per annum ought the railway stock to pay, so that he may increase his income £40 a year by the transaction?

(738) A engages £15000, B £9000 in a business. The gross receipts for the first year are £5600, but of this 5 per cent. is paid for insurances, and $\frac{1}{7}$ for other expenses: of the rest B receives a certain sum for managing, and the remainder is divided between them in proportion to the capital employed. If A receives £2500, find B's salary as manager.

Oxford and Cambridge Schools Exam. 1877. 739 to 750.

(739) Divide 37 yds. 2 ft. 3 in. (i) by 151, (ii) by 4 yds. 7 in.

(740) Find the least number which can be divided by 9, 12, 15, 20, and leave a remainder 7 in every case.

(741) Simplify

$$\overline{17\tfrac{1}{2}\times[6-\{3+(\tfrac{1}{2}+\tfrac{1}{3})\}]}-\overline{17\tfrac{1}{2}\div[6-\{3\times(\tfrac{1}{2}+\tfrac{1}{3})\}]};$$

and find the value of

$$3\tfrac{3}{8} \text{ of } £1\ 2s.\ 6d. - \tfrac{2}{5} \text{ of } 17s.\ 6d. - \tfrac{1}{6} \text{ of } £3\ 3s.$$

Reduce the latter result to the fraction of £4 5*s*.

(742) State the rules for the multiplication and division of decimals.

Multiply 1·702 by 2·9015; and divide the product by ·0005803.

(743) Simplify $\{2\tfrac{2}{5}+3{\cdot}5-5{\cdot}1\dot{2}9\dot{6}\}\times{\cdot}\dot{7}2\dot{9}$; and express the result as a decimal.

(744) Find the cost of 201 cwt. 3 qrs. 18 lbs. 10⅔ oz. at £5 7*s*. 6*d*. per cwt.

(745) If 20 men can finish in 12 days a piece of work which 40 boys can do in 15 days, how many boys will be required to help 18 men to finish the same piece of work in 10 days?

(746) Distinguish between interest and discount.

(i) Find the discount on £394 6*s*. 8*d*. due at the end of 2 years at 4 per cent. compound interest.

(ii) The discount on a certain sum of money due at the end of a certain time is £1870; and the interest on the same sum of money for the same time is £2452 16*s*. 4*d*. What is the sum?

(747) A man invests equal sums in the Portuguese three per cents. at 50½ and the Russian five per cents. at 75½, and receives annually from these investments an income of £95 16*s*.; how much does he invest in each? and which is the better investment?

(748) A draper buys 240 yards of silk; he sells ¼ of it at a gain of 25 per cent., ⅓ at a gain of 20 per cent., and the remainder at a loss of 15 per cent., and receives £160; what was the cost price per yard?

(749) A bag contains 150 coins which are sovereigns, half-crowns, and shillings: the value of the half-crowns is double that of the shillings and half that of the sovereigns how many coins of each kind are there in the bag?

(750) A cubical stone cistern can hold a volume of water which weighs $37037\cdot\dot{0}3\dot{7}$ oz. If the sides are made of stone an inch thick, find the weight of the stone, supposing that a cubic foot of stone weighs 2700 oz. and a cubic foot of water weighs 1000 oz.

Oxford Junior Paper, 1878. 751 to 763. Preliminary.

(751) Divide two million four hundred and ninety thousand two hundred and one by four thousand and eighty-nine.

(752) Multiply twenty-nine pounds nineteen shillings and tenpence three-farthings by a hundred and ninety-two.

(753) Thirty-three telegraph posts, placed at equal distances, extend a mile; how far apart are the posts?

(754) Divide 198 acres 3 roods 16 perches 3 yds. 72 in. by 187.

(755) Find the cost of a ton of sugar at $\frac{3}{4}$*d.* per lb., of an ounce of tea at 5*s.* 8*d.* per lb., and of a peck of flour at £3 per quarter.

(756) If 3 men do a piece of work in 60 days, how many will do it in 20 days?

(757) If 159 articles cost 19*s.* 10$\frac{1}{2}$*d.*, find the cost of 161 such articles.

(758) Add together $1\frac{1}{2}$, $2\frac{5}{6}$, $3\frac{5}{11}$, $4\frac{7}{33}$. Also multiply together $4\frac{4}{9}$, $2\frac{2}{5}$, $3\frac{1}{4}$, and divide the product by $1\frac{2}{5}$.

(759) Divide ·72 by 1·8, by 18, and by ·018. Also express half-a-crown as the decimal fraction of a £, and find the value of ·00009765625 of a ton.

Extra.

(760) If 25·4 francs be equivalent to £1 sterling, find the value in English money of 511·175 francs.

(761) Find by *Practice* the rent of 30 acres 3 roods and 26 poles at £2 13*s.* 4*d.* per acre.

(762) Divide £180 among A, B, and C, so that A may receive three times as much as B, and B and C together may receive half as much as A.

(763) Find the compound interest and amount of £4,800 for 2 years at 4 per cent.

(764) Simplify

Oxford Senior Paper, 1878.

$$\frac{1\frac{1}{2}}{4\frac{1}{3}}+\frac{3\frac{1}{3}-2\frac{5}{6}}{4\frac{1}{2}+5\frac{9}{10}}+\frac{3}{26}\text{ of }5\frac{1}{4}.$$

(765) Find the difference between $\frac{5}{3}$ of £1 13*s*. 9*d*. and $\frac{3}{7}$ of £5 18*s*. 5*d*., and reduce the result to the fraction of a guinea.

(766) Find the L.C.M. of 48, 27, 81, 165, and 110; and the G.C.M. of 6023 and 15466.

(767) Make out a bill for the following articles:—$17\frac{1}{2}$ yards of silk, at 11*s*. $7\frac{1}{2}$*d*. a yard; 648 buttons, at 1*s*. $9\frac{1}{2}$*d*. a gross; $15\frac{1}{2}$ yards of velvet, at 1*s*. $11\frac{1}{2}$*d*. a yard; and 153 reels of cotton, at 11*d*. a dozen.

(768) A person selling apples at 3 for a penny gains 5 per cent.; find the gain or loss per cent. when 25 are sold for sixpence.

(769) Find the number of men required to mow 114 acres in 9 days, if 14 men can mow 76 acres in 6 days.

(770) Reduce £3 17*s*. 6*d*. and £14 10*s*. $7\frac{1}{2}$*d*. each to the decimal of £1, and divide the second result by the first.

(771) I invest £7560 in the three per cents. at $94\frac{1}{2}$, and when the funds fall to 90 I sell out a quarter of my stock; afterwards, when the funds are at $94\frac{3}{4}$, the remainder of the stock is sold; what is the alteration in my capital?

Cambridge Higher Local Paper, 1878. 772 to 785. Part I.

(772) If from two hundred and seventy-nine thousand nine hundred and three we deduct thirty-nine, the remainder is exactly divisible by 8 times that number; what is the quotient?

(773) I have due to me six sums of £4 9*s*. $3\frac{1}{2}$*d*. each, seven of £1 2*s*. $6\frac{3}{4}$*d*., and one of £3 0*s*. $11\frac{3}{4}$*d*.; how long will the money last me at £1 3*s*. 7*d*. a week?

(774) Reduce to their simplest forms the fractions

$$\frac{1432}{11277}\text{ and }\cfrac{5}{5+\cfrac{2}{2+\cfrac{1}{1+\frac{1}{3}}}}$$

and find their sum.

(775) Divide $15749{\cdot}344$ by $\cdot 3406$.

(776) After deducting a rate of 8*d.* in the pound, each of 49 poor persons receives from a charity a dole of £4 11*s.* 10*d.*; what was the whole benefaction?

(777) Find the rent of 6 acres 3 roods 25 poles $2\frac{3}{4}$ yards, at £5 10*s.* per acre.

(778) Reduce the difference between $\cdot 07\dot{8}\dot{2}$ of 1 lb. 7 oz. 16 dwt. and $1\frac{5}{6}$ of $\dfrac{1}{2\frac{1}{5}} \div \dfrac{1\frac{3}{4}}{2\frac{7}{10}}$ of 5 oz. 5 dwt. to the decimal of 1 lb. 1 oz. 4 dwt.

(779) Compare the simple interest for £233 18*s.* 6*d.*, for $3\frac{1}{3}$ years at $7\frac{1}{2}$ per cent., with the discount on £295 5*s.* due $8\frac{1}{3}$ years hence at 3 per cent.

(780) Add together $5{\cdot}6\dot{3}\dot{1}$, $\cdot 0\dot{4}\dot{2}$, $\cdot\dot{9}7\dot{6}$ and $8{\cdot}349\dot{4}8766\dot{9}$.

Part II. (781) I was doubting whether to sell a horse at a price which would have ensured my losing $8\frac{1}{2}$ per cent. when I got another bid of 218 guineas and thereby cleared 9 per cent.: what was the first bid made?

(782) A person had railway preference stock bearing 5 per cent. interest which brought him in £800 a year. He sold out at 113 and reinvested in canal stock, which paid 3 per cent. He had to pay the broker $\frac{1}{8}$ per cent. on each transaction. At what price did he reinvest so as to gain £40 per annum?

(783) The managers of a building company contracted to buy for £45,000, through A, land which they might have bought direct from B for £28,000. The company expended £60,000 in improving the property and had to borrow £20,000 of this at 5 per cent. The dividend paid on the subscribed capital was 4 per cent. What was the loss in income to a holder of £8800 stock owing to this mismanagement?

(784) A butler stole wine from a butt of sherry which contained 25 per cent. of spirit; he replaced this by wine taining 9 per cent. only of spirit; the cask was then of

13 per cent. strength only; how much of the wine had he stolen?

(785) In what time will £1455 amount to £2328, if, in 3 years, £430 amount to £494·5 at simple interest?

Cambridge Junior Paper, 1878. 786 to 797.

(786) Of the six million pounds granted by Parliament for military preparations in February last, only three million four hundred and ninety-three thousand nine hundred and twenty-nine were spent at the end of the financial year. How much was left in hand? Write the result in words.

(787) What is the cost of a city dinner at £4 13*s*. 9*d*. per head, the number of guests being 312?

(788) A lady bought equal quantities of sugar at $3\frac{1}{2}d$. per lb., tea at 3*s*. 9*d*. per lb., butter at 1*s*. $11\frac{1}{2}d$. per lb., coffee at 1*s*. 4*d*. per lb. The whole cost was £1 16*s*. 8*d*. How much of each did she buy?

(789) A man agreed to buy a haystack, paying £10 for each waggon load. He found his waggon held 1 ton 3 cwt. 2 qrs., and that the whole stack weighed 10 tons 11 cwt. 2 qrs. How much has he to pay?

(790) Find by *Practice* the value of a nugget of gold weighing 3 lbs. 11 oz. 18 dwts. 4 grs. at £3 17*s*. 6*d*. per oz.

(791) Find the value of

(i) $3\frac{1}{2}-4\frac{1}{3}+5\frac{1}{4}-6\frac{1}{5}+7\frac{1}{6}$.
(ii) $\frac{2}{5}$ of £33 5*s*. 10*d*.$-\frac{4}{11}$ of £31 2*s*. 5*d*.

(792) If $\frac{1}{5}$ of a sheep be worth £$\frac{2}{3}$, and $\frac{3}{7}$ of a sheep be worth $\frac{1}{14}$ of an ox; how much must be given for 100 oxen?

(793) Express seventy-three ten-thousandths as a decimal.

Simplify 1·44 of $\frac{\cdot 0032}{7\cdot 2}$ without converting the decimals into vulgar fractions.

Find the value of ·375 of £3 17*s*. 6*d*.

(794) Find the true discount on £377 13*s*. for 1 year

and 3 months at 3 per cent.; and also the simple interest on the same sum for the same time at 5 per cent.

(795) Supposing the area of a circle to be $3\frac{1}{7}$ times the square of the radius, find the weight of a circular disc of cast iron 7 ft. in diameter and $1\frac{1}{3}$ in. thick; it being given that a plate 1 ft. square and 1 in. thick weighs $37\frac{1}{2}$ lbs.

(796) It costs £643 10*s.* 9*d.* to level and turf a square cricket ground at 9*d.* per square yard. What will it cost to enclose it with an iron railing at 7*s.* 6*d.* per yard?

(797) A man has been paying income tax at 3*d.* in the £. The tax is raised to 4*d.* in the £; but he is now allowed to deduct £180 from his income, paying tax on the remainder only. The total amount of tax he now pays is the same as before. Find his income.

Cambridge Senior Paper, 1878. 798 to 810.

(798) Find the number of seconds from the beginning of the year to the time fixed for giving out this paper (Dec. 17 at 9 A.M.); express the result in words. Reduce the same number of farthings to pounds.

(799) If a number of articles at £3 4*s.* $5\frac{1}{4}$*d.* a piece cost £5647 18*s.* $11\frac{1}{4}$*d.*, how many are there?

(800) Find the G.C.M. and L.C.M. of 14938, 23474, and 32010. Find the smallest sum of money which can be divided exactly into shares of £23 16*s.* 8*d.* or £31 3*s.* 4*d.* each.

(801) Find by *Practice* the cost of $14311\frac{1}{2}$ things at 12*s.* $9\frac{1}{2}$*d.* each.

(802) Simplify

(i) $1\frac{3}{8}+3\frac{1}{3}-5\frac{5}{6}+2\frac{1}{4}-1\frac{1}{12}$.

(ii) $$\frac{3\frac{1}{3}-1\frac{1}{2}\text{ of }1\frac{1}{5}-1\frac{1}{7}}{(3\frac{1}{3}-1\frac{1}{2})\text{ of }(1\frac{1}{5}-1\frac{1}{7})}\times\frac{3\frac{1}{3}-1\frac{1}{2}\text{ of }(1\frac{1}{5}-1\frac{1}{7})}{(3\frac{1}{3}-1\frac{1}{2})\text{ of }1\frac{1}{5}-1\frac{1}{7}}.$$

(803) Find the value of £·596875, and reduce 11 poles 4 yds. $4\frac{1}{2}$ in. to the decimal of one mile.

(804) If a railway journey of 177 miles 3 furlongs takes hours $56\frac{1}{2}$ minutes, what is the rate per hour?

(805) What sum will amount to £5431 15*s.* 11¼*d.* in 6 years at 4¼ per cent. simple interest?

(806) Prove that the difference between the interest and the discount on any sum of money for a given time is equal to the interest on the discount for that time; simple interest being reckoned at the same rate throughout.

(807) A grocer buys 3½ cwt. of tea at £13 16*s.* per cwt. and 4 cwt. at £12 12*s.* per cwt.; he sells 7 cwt. at 2*s.* 9*d.* per lb.; at what price per lb. must he sell the rest so as to gain 12½ per cent. on the whole cost?

(808) A certain income can be obtained by an investment in the 3¼ per cents. at 93⅜; the same income can also be obtained by investing £1595 less in the 4¼ per cents. at 105⅜, no brokerage being charged on either transaction. What is the income?

(809) The sides of two squares contain 77 yards. 1 ft. 9 in. and 7 yards 2 ft. 4 in. respectively; find the side of a square whose area is equal to the sum of the areas of the two squares.

(810) If two boats A and B row in a race at their usual speed, A will win by 80 yards; but the day proving unfavourable A can only row at $\frac{8}{9}$ of its usual speed, while B rows at $\frac{9}{10}$ of its usual speed. A wins by 26 yards. Find the length of the course.

Oxford Junior Paper, 1879. 811 to 823. Preliminary.

(811) Multiply one hundred and ninety-eight millions seventeen thousand and six by four thousand and eighty-five.

(812) Reduce 574 pints to bushels, pecks, gallons, and quarts.

(813) Divide £11705 12*s.* 6*d.* by 100.

(814) A farmer pays 30*s.* an acre rent on a farm of 215 acres, and the working expenses amount to £589 17*s.* 4¾*d.* His receipts are £1305 6*s.* 8*d.* Find his nett income.

(815) Multiply together 3⅔, 3⅗, $\frac{5}{11}$, $\frac{7}{18}$; and reduce 9*s.* 4*d.* to the fraction of 7*s.* 7*d.*

(816) Reduce to vulgar fractions ·072 and $1{\cdot}48\dot{3}$. Divide ·07 by 14 and by ·014.

(817) If a carrier pigeon flies $17\frac{1}{2}$ miles in 15 minutes, how long will it take to fly 14 miles?

(818) If a ship sails 110 miles in eleven hours, how many feet does it pass through in a minute?

(819) Find the cost of 3 tons 2 cwt. 6 lbs. of sugar at $2\frac{1}{2}$*d.* per lb.

Extra. (820) Find the cost of carpeting a room 20 ft. 3 in. long and 13 ft. 6 in. broad at 5*s.* 4*d.* per square yard.

(821) The circumferences of two wheels of a locomotive are 5 and 6 yards respectively. If the smaller make 704 revolutions in a given time, when the engine travels at the rate of 40 miles an hour, how many revolutions will the larger make in the same time, when the engine travels at the rate of 60 miles an hour?

(822) A grocer mixes 72 lbs. of tea at 2*s.* $10\frac{1}{2}$*d.* per lb. with 90 lbs. of tea at 2*s.* 6*d.* per lb.; at what price per lb. must he sell the mixture so as to gain 5*d.* per lb.?

(823) Find the difference between the simple and compound interest on £2718 15*s.* for 2 years at 3 per cent.

Oxford Senior Paper, 1879. 824 to 832. (824) Find the cost of 213 articles at £1 19*s.* $2\frac{1}{4}$*d.* each, and of 17 cwt. 1 qr. 12 lbs. at £1 19*s.* 8*d.* per cwt.

(825) Simplify

$$\text{(i)}\ \frac{2592}{3456};\quad \text{(ii)}\ \frac{2\frac{2}{3}-1\frac{1}{2}}{2\frac{2}{3}+1\frac{1}{2}}+\frac{2\frac{3}{5}\text{ of }9}{2\frac{4}{11}\text{ of }2\frac{3}{4}\text{ of }5}.$$

(826) Find the value of $1\frac{81}{239}$ of £2 19*s.* 9*d.*

(827) Divide $\cdot 64$ by $\cdot 016$, and multiply $6\cdot 7\dot{6}$ by $\cdot 0\dot{5}$.

(828) Find the value of $\cdot 03\dot{5}7142\dot{8}$ of a guinea; and of $\cdot 9$ pole + $\cdot 241$ yard + $\cdot 87$ ft. + $\cdot 684$ in.

(829) After paying $\frac{1}{3}$ of my money to one person, $\frac{1}{2}$ to another, and $\frac{1}{48}$ to a third, I had $1\frac{3}{4}$*d.* left. How much had I at first?

(830) A person walks at the rate of $3\frac{1}{2}$ miles an hour. Three hours after he is followed by another person walking

at the rate of 5 miles an hour. In what time will the latter overtake the former?

(831) If a horse be sold for £90 at a gain of 20 per cent., what was the cost price of the horse?

(832) If 4 lbs. of bread cost 5½*d.* when wheat is at 44 shillings per quarter, what is the cost of 6 lbs. of bread when wheat is at 48 shillings per quarter?

Royal College of Surgeons, 1878. 833 to 841.

(833) If sugar be bought at 19*s.* 9*d.* per cwt., and retailed at 3¾*d.* per lb., what is the profit on a cask containing 7 cwt. 1 qr. 14 lbs.?

(834) A farmer rents one field of 12 acres 25 poles 16½ sq. yds. at £17 4*s.* 3½*d.*, another of 17 acres 1 rood 14 poles 17¼ sq. yds. at £26 15*s.* 11*d.*, and a third of 13 acres 2 roods 4 poles 18½ sq. yds. at £34 17*s.* 6½*d.* Find the average rent per acre of the three fields.

(835) Simplify

(α) $1\frac{9}{10}-\frac{13}{30}+2\frac{1}{5}-\frac{12}{25}$.

(β) $\frac{4}{5}$ of $6\frac{1}{4}-\frac{3}{7}$ of $14+\frac{5}{8}$ of $\frac{7}{10}$ of $2\frac{2}{7}$.

(836) Four-fifths of a draper's stock was destroyed by fire, $\frac{7}{8}$ of the remainder was injured by water. He sold the injured goods at half their cost price, for £210, and the uninjured goods he sold for £75. What did he lose by the fire?

(837) Find in inches and fraction of an inch the value of $\cdot 000\dot{3}$ of a mile, and give reasons for the process employed.

(838) Find the value of

(α) $\dfrac{6\frac{3}{5}}{16\frac{1}{2}}$ of $\cdot 001\dot{6}$ of 120 guineas.

(β) $\cdot\dot{2}\dot{7}$ of $1\cdot 21\dot{0}\dot{9}$ of 3 fur. 23 poles.

(839) Extract the square root of

(α) ·0081270225. (β) $128\frac{4}{9}$.

(840) An agent collecting rents at a commission of $4\frac{3}{8}$ per cent., deducted his commission and paid over £741 1*s.* 10½*d.* What amount of rents did he collect?

(841) A vessel containing 21·84375 barrels of beer is emptied by a pitcher which contains, when full, ·078125 gallons. How many times can the pitcher be filled entirely, and what fraction of a pint will it contain when the last quantity of beer is poured into it?

(842) I have a cheque for £16 10*s.*, and in coins, 13 farthings, 45 halfpence, 96 sixpences, 67 shillings, 97 half-crowns, 126 crowns, 65 half-guineas, and 77 guineas; how much have I altogether?

Royal College of Surgeons, 1879. 842 to 851.

(843) Give the cost of 36 cwt. 2 qrs. $17\frac{1}{2}$ lbs. of sugar at £1 17*s.* 6*d.* per cwt.; and of 2 lbs. 5 oz. 2 sc. of nitrate of silver at 4*s.* 9*d.* per oz.

(844) Find the G.C.M. of 126, 210, and 315; also the L.C.M. of 63, 12, 84, and 14.

(845) Find the values of

(*a*) $\frac{4}{5}+\frac{7}{10}+\frac{4}{7}+\frac{2}{21}$.
(*b*) $1\frac{4}{7}+3\frac{1}{10}+\frac{13}{15}+7\frac{5}{16}+\frac{9}{28}+\frac{2}{7}$ of $\frac{1}{5}$.
(*c*) $125-\frac{2}{7}$ of 14.
(*d*) $\frac{1}{2}$ of $\frac{4}{5}$ of $\frac{3}{4}-\frac{2}{9}$ of $\frac{3}{4}$.

(846) Find the values of

(*a*) 81·4632 × ·0378. (*b*) 7·6 × ·071 × 2·1 × 29.
(*c*) ·025075 ÷ 1·003. (*d*) ·02916 ÷ ·0012.

(847) Cleopatra's Needle on the Thames Embankment, which is erected upon a pedestal 16 ft. high, casts a shadow of 23 yards $1\frac{2}{9}$ ft.; the pedestal at the same time throws one of 4 yards $2\frac{2}{9}$ ft. What is the total height of the Needle and the pedestal?

(848) What is the interest of £317 16*s.* for $5\frac{3}{4}$ years at $3\frac{1}{2}$ per cent. per annum?

(849) What amount of money must be invested at $3\frac{1}{2}$ per cent. in order to obtain an income of £300 per annum?

(850) Required the exact square roots of 155236 and 549·9025.

(851) How many gallons of water must I add to a pipe

of wine, which cost £91 10*s.*, that I may sell it at 12*s.* per gallon, without loss or gain?

Incorporated Law Society, 1879. 852 to 863.

(852) Explain the decimal system of arithmetic, and show how it is that we are enabled to express any number, however great.

(853) What is the difference between abstract and concrete numbers? Show that 27 multiplied by $12=12$ multiplied by 27.

(854) Can you attach any meaning (i) to the multiplication of 6*s.* 8*d.* by £1 4*s.* 9*d.*, (ii) to the division of 1 yard 2 ft. 3 in. by 6 ft. 8 in.? Give your reasons for your answer.

(855) Divide 7398758 by 121: first by Short Division (two factors), and secondly by Long Division. How do you get at the complete remainder from the two remainders in the first method?

(856) Define a fraction. How many kinds of fractions are there? Give examples of each. Find the sum, in the lowest terms, of the mixed numbers $1\frac{2}{3}$, $5\frac{6}{11}$, $2\frac{9}{10}$, $4\frac{5}{21}$, $1\frac{3}{22}$.

(857) State the rules for the multiplication and division of decimals. What decimal multiplied by 125 will give the sum of $\frac{5}{8}$, $\frac{7}{16}$, $\frac{3}{4}$, ·09375 and 2·46?

(858) A father is 45 years of age when his son is 20. How soon will the age of the son be $\frac{3}{5}$ the age of the father?

(859) To do 150 yards of work 5 men were employed for 12 days, 12 hours a day; how many hours a day must 30 men work during 20 days to do 500 yards of the same work?

(860) Divide £627 between 3 persons so that the share of the first may be to that of the second as $\frac{2}{3}$ to $\frac{3}{4}$, and that of the second to that of the third as $\frac{4}{5}$ to $\frac{8}{7}$.

(861) It is half-past 3 o'clock. At what hour will the two hands of the watch meet for the first time?

(862) A greyhound pursues a hare which is 95 springs ahead: the greyhound makes 6 springs to the hare's 8, and 4 springs of the greyhound are equivalent to 7 of the hare.

How many springs must the greyhound make to catch the hare?

(863) What o'clock is it when the part of the day that is gone is $\frac{3}{5}$ of that which remains?

(864) Multiply nine millions nine thousand and nine by twenty thousand and twenty, and express the result in words.

Incorporated Law Society, 1879. 864 to 875.

(865) In the room of a miser there were 23 secret drawers, in each drawer 13 stockings, in each stocking 3 gloves, and in each glove 3 guineas, 6 sovereigns, 3 crowns, 3 half-crowns, and 33 pence. What was the amount of his hoard?

(866) If £857 5*s.* 8¼*d.* be divided equally between 41 persons, how much would each receive?

(867) How many steps did a man take in walking from London to Edinburgh, a distance of 400 miles, whose steps were two feet long?

(868) How many minutes were there in the Easter holidays, which commenced at 7 o'clock in the morning of April 9, and ended at 8.30 on the evening of May 4?

(869) How much may a person spend in 73 days if he wishes to lay by every year 50 guineas out of an income of £450?

(870) Add together 4, $2\frac{2}{5}$, $3\frac{7}{12}$, $4\frac{1}{15}$, and $4\frac{8}{9}$; subtract $9\frac{3}{19}$ from $11\frac{1}{57}$; and divide $1\frac{6}{43}$ by $1\frac{15}{83}$.

(871) After taking out of my pocket $\frac{2}{3}$ of its contents, $\frac{2}{3}$ of the remainder was found to be 13*s.* 5½*d.* What sum had I at first?

(872) State and prove the rule for pointing in the multiplication of decimals. How do you determine the local value of the quotient figures in the division of decimals? Multiply £2 16*s.* 10·75*d.* by 144·33, and divide £9753 14*s.* 8¼*d.* by 234·5.

(873) How long would 17 men take to mow a field which 40 men can do in 185 hours?

(874) A man walks towards a town 12 miles off at the

rate of 4 miles an hour; 15 minutes afterwards a friend goes after him at $4\frac{1}{2}$ miles an hour. When and where will he meet him?

(875) How much per cent. per annum gives three farthings on half-a-crown per month?

(876) Simplify

Oxford
University
Responsions,
1879.
876 to 887.

(*a*) $1\frac{1}{2}-2\frac{2}{3}+3\frac{3}{4}-4\frac{4}{5}+5\frac{5}{6}$;

(*b*) $\dfrac{(\frac{5}{12}\text{ of }3\frac{1}{5})\times(\frac{1}{15}\div\frac{1}{2})}{(2\frac{1}{3}\div\frac{7}{8})\div(1\frac{2}{3}\times 16)}$.

(877) Find the value of

(*a*) 15·02 − ·168 + ·04123 − 2·5;

(*b*) ·023 × 1·05;

(*c*) 2·055 ÷ 8·22.

(878) Express as decimal fractions $\frac{3}{80}$ and $\frac{11}{455}$; and as vulgar fractions in their lowest terms ·0512 and ·6$\dot{6}$21.

(879) Reduce 1 cwt. 6 lbs. 2 oz. to the decimal of a ton; and find the value of ·02125 of £15.

(880) Find (*a*) the cost of 1043 articles at £1 13*s*. $8\frac{1}{2}$*d*. each, (*b*) the value of 11 lbs. 8 oz. 10 dwts. of gold at £3 17*s*. $10\frac{1}{2}$*d*. per oz.

(881) A person sends from India to England 390 rupees per calendar month. If a rupee be worth 1*s*. $9\frac{1}{2}$*d*., what will be the value in £ *s*. *d*. of the sum sent in a year? If a rupee be worth only 1*s*. $7\frac{1}{2}$*d*., how many rupees per month must be sent that the value in £ *s*. *d*. of the sum sent in a year may remain the same as before?

(882) What length of paper 2 ft. 3 in. wide will be required to cover the walls of a room 13 ft. 3 in. high, 22 ft. 7 in. long, 17 ft. 5 in. broad, containing a door 10 ft. 6 in. high by 4 ft. broad, two windows each 9 ft. 4 in. high by 5 ft. 3 in. broad, and two fireplaces, one 4 ft. high by 5 ft. broad, and the other $4\frac{1}{2}$ ft. high by 6 ft. broad?

(883) Find the square root of

(*a*) $10\frac{1}{36}$; (*b*) 313·29; (*c*) ·0289.

(884) A book is published at 10*s*. a copy, and sold by a

bookseller for cash at 7*s.* 11*d.* What is the discount allowed in the shilling? If each copy costs the bookseller 6*s.* 3*d.* what is his profit per cent.?

(885) If half a ton of turnips will feed 40 sheep for a fortnight, what quantity will feed 65 sheep for five weeks?

(886) A man invests £4500 in a three and a half per cent. stock at 96. How much stock does he purchase, and what will be his annual income from the stock?

(887) Find the compound interest on £1024 for 3 years at 5 per cent.

Cambridge University Previous Exam., 1878. 888 to 899.

(888) Subtract nine hundred and sixty-seven thousand and eighty-nine from eight million seven hundred thousand and three; express the result in words.

(889) What is meant by the greatest common measure of two numbers?

Find the greatest common measure and the least common multiple of 4781 and 6147?

(890) Simplify

$$\frac{\frac{3}{4}+\frac{2}{5}}{\frac{3}{4}-\frac{2}{5}} \times \frac{2\frac{2}{3}}{\frac{2}{3}+\frac{3}{7}}.$$

(891) Subtract $\frac{13}{14}$ of $\frac{1}{6}$ of a guinea from $\frac{2}{5}$ of $\frac{7}{16}$ of £1, and express the difference as a decimal of half-a-crown.

(892) Multiply 91·77 by ·091, and divide the product by 2·73.

(893) Find the rent of 643 acres 1 rood 27 poles of land at £1 16*s.* 8*d.* per acre.

(894) How many cwt. of lead will be required to cover a roof of 48 ft. long and 32 ft. wide with a sheet of lead $\frac{1}{12}$ of an inch thick? A cubic foot of lead weighs 12096 oz.

(895) A grocer has two sorts of tea which cost him 3*s.* and 3*s.* 6*d.* per pound respectively: in what ratio must he mix them so as to gain 10 per cent. by selling the mixture at 3*s.* 8*d.* per pound?

(896) What is the present worth of a bill for £396 14*s.* 4*d.* due 30 days hence, at 4 per cent. per annum?

(897) How much three per cent. stock has been sold out at 89, if the owner's income be increased by £12 a year by investing the proceeds in four per cent. stock at 92?

(898) Find the difference between the simple and compound interest of £560 for four years at 5 per cent. per annum.

(899) Income tax is at present levied on all incomes over £150, £120 being deducted from incomes under £400 before the tax is reckoned. A man observes that his tax this year, at 5*d.* per pound, will amount to the same as a tax at 2*d.* per pound upon his whole income. What is his income?

London University Matriculation, 1878. 900 to 904.

(900) Reduce to fractions in their lowest denomination the sums

$\frac{2}{3}+\frac{3}{4}+\frac{4}{5}+\frac{5}{6}+\frac{6}{7}$; $\frac{1}{3}+\frac{3}{8}+\frac{2}{5}+\frac{5}{12}+\frac{3}{7}$; and $\frac{2}{9}+\frac{1}{4}+\frac{4}{15}+\frac{5}{18}+\frac{2}{7}$; and determine the ratio which the first bears to each of the others.

(901) Reduce the recurring decimal $\cdot 01\dot{7}4\dot{7}$ to a vulgar fraction in its lowest terms.

(902) Determine the height of Mont Blanc in old Parisian feet; its height being given as 15784 in English feet, and the ratio of the English to the old Parisian foot being as 1·0297 to ·9662.

(903) The sides of a rectangular piece of land are in the ratio of 2 to 7. What is the length of each side, if the area contains 341373816 sq. ft.?

(904) The square root of 9·8696044011 is 3·14159, with a remainder=·0000166730. Find the next three decimals of the square root.

Oxford and Cambridge Schools Exam. 1879. 905 to 918.

(905) Find the difference between one million three hundred and four farthings, and sixty-two thousand four hundred and fifty-nine fourpenny pieces.

(906) What is the value of 45 acres 3 roods 25 perches at £111 11*s.* 4*d.* per acre?

(907) A bill of £3 0*s.* $11\frac{1}{2}$*d.* has to be paid by several persons in equal shares; if three of them together pay 16*s.* $7\frac{1}{2}$*d.*, how many are there to share the cost?

(908) By how many times $3\frac{1}{3}$ must the difference between $\frac{3}{7}$ of $4\frac{1}{4}$ and $\frac{5}{8}$ of $9\frac{1}{5}$ be multiplied to make it equal to $25 \times 1\frac{4}{7}$?

(909) Divide 5·681 by ·0019, and multiply the quotient by $\frac{3}{23}$ of ·0001564.

(910) Reduce $\frac{\cdot 1\dot{8}}{289}$ of 7 tons 13 cwt. to the decimal of $\frac{2}{3}$ of a cwt.

(911) Simplify

$$3\tfrac{7}{18} \text{ of } \tfrac{426}{427} \div 71 + 2\tfrac{3}{70} \text{ of } \tfrac{3}{65} \text{ of } \tfrac{5}{44} - \tfrac{7}{190} \text{ of } 1\tfrac{11}{84}.$$

(912) If 1 ton 16 cwt. 3 qu. 10 lbs. of coal cost £2 7*s.* 6*d.*, how much can be bought for £17 16*s.* 3*d.*?

(913) Find the square root of 315956·41.

(914) If $3{\cdot}7\dot{9}$ of 45 guineas will purchase $1\frac{3}{4}$ acre, how many roods will $\frac{1}{3}$ of £538 13*s.* purchase?

(915) Find the true discount on £140 15*s.* $7\frac{1}{2}$*d.* for $4\frac{1}{2}$ months at $5\frac{1}{3}$ per cent.

(916) A, B, and C start together to walk round a circular course 280 yards in circumference; their rates of walking are 4, 5, 6 miles respectively per hour; after what time will they all be together again at the starting point, and how many rounds will each of them have then made?

(917) A man embarks his whole property in four successive ventures. In the first he clears 100 per cent., and in each of the others he loses 20 per cent. Show that there remains to him 2·4 per cent. profit on his original outlay.

(918) A, B, and C respectively invested £6413, £5247, and £4081 in a business in which the net profits, in one year, were £1462 6*s.* $0\frac{3}{4}$*d.* What was the share of each?

Oxford and Cambridge Schools Exam. 1879. 919 to 930.

(919) Multiply $1093\frac{19}{25}$ by $89\frac{1}{16}$, and find the greatest common measure of 104895 and 693693.

(920) Reduce $\dfrac{1+\frac{1}{4}+\frac{1}{9}}{1+\frac{5}{2}+\frac{7}{5}}$ to its simplest form; and express £61 18*s.* $1\frac{1}{2}$*d.* as the decimal of £283.

(921) Express $\frac{831}{3367}$ as a circulating decimal; subtract $\cdot\dot{0}2\dot{7}$ from the result; and express the remainder as a vulgar fraction.

Subtract $\cdot\dot{1}9047\dot{6}$ of a guinea from $\cdot 208\dot{3}$ of a pound; and express the remainder as the decimal of 1*s.* 4*d.*

(922) Extract the square root of 429496·7296 and the cube root of 2079995·797125.

(923) A cubic fathom of water weighs 6 tons, and a kilogram is the weight of a cubic decimetre of water. If 100 decimetres be equal to 11 yards, express a kilogram in pounds and fraction of a pound.

(924) The capital of a firm consists of £1426 6*s.*, £1929 14*s.*, and £4782 6*s.* subscribed by three partners. Divide £15617 amongst them, in proportion to their several shares of the capital.

(925) A bankrupt's debts amount to £1000. Half of his goods are sold $31\frac{1}{4}$ per cent. and the other half $12\frac{1}{2}$ per cent. below their value. His creditors receive 12*s.* 6*d.* in the £. What is the value of his goods?

(926) Find the price of 3 cwt. 1 qr. 26 lbs. 10 oz. at £60 8*s.* per cwt.

(927) Find the amount of £5120000 in 5 years at $2\frac{1}{2}$ per cent. compound interest.

(928) A man's income from the Three per Cent. Consols is £750. He sells out half his stock at 96, and invests it in other securities at 120. If his income be increased by £50, what interest do these securities pay?

(929) A company of men can be formed either into a solid square, or into a hollow square 9 deep, having 970

men in the front rank of each side. How many men are there in the company, and how many in each side of the solid square?

(930) The areas of the faces of a rectangular solid are 9 sq. ft., 16 sq. ft., and 25 sq. ft. respectively. Find the contents of the solid, and the length of each edge.

Cambridge Higher Local Paper 1880. 931 to 942. Part I.

(931) Multiply £457 16*s.* $4\frac{1}{2}$*d.* by 363; and divide 73 tons 15 cwt. 2 qrs. 8 lbs. by 88.

(932) Find the value of a crop of potatoes growing on 3 roods 31 perches 15 yds. 1 ft. 18 in. at £23 per acre.

(933) Reduce to their simplest forms and find the product of

$$1\frac{1}{2} \text{ of } \frac{72198}{48321} \text{ and } \frac{\frac{2}{3} \text{ of } \frac{5}{9} - \frac{3}{7} \text{ of } \frac{1}{12}}{\frac{3}{14} \text{ of } \frac{1}{18} + \frac{5}{12} \text{ of } \frac{4}{7}}.$$

(934) Divide 8404·99599 by 834·657.
Multiply $\cdot 7\dot{4}99\dot{9}$ by $\cdot\dot{1}6835\dot{0}$.

(935) From the sum of $\dfrac{\frac{3}{17}+\frac{1}{3}}{5-\frac{2}{3}} \div \dfrac{\frac{3}{4}}{4\frac{1}{4}}$ of 4*s.* 6*d.*, and $\cdot 0\dot{1}\dot{8}$ of £14 13*s.* 4*d.* take $\cdot 00\dot{5}7142\dot{8}$ of £21 17*s.* 6*d.*

Reduce the result to the decimal of £2 2*s.*

(936) If I accept £750 as present payment for £795 due 16 months hence, at what rate do I allow discount?

Part II.

(937) Find the sum of money which in 3 years at 5 per cent. compound interest will amount to £1065 0*s.* $3\frac{3}{5}$*d.*

(938) A has sugar worth 4*s.* 9*d.* a stone; B has flour, and offers to exchange this for A's sugar. When B weighs out his flour he loads his scalepans so as to defraud A of $\frac{2}{21}$ of the flour due to him. A discovers the trick and raises the price of his sugar accordingly. What price does he charge B?

(939) If in 5 years £6520 amount to £7824, in what time at the same rate will £450 amount to £531?

(940) On a certain farm the labour in one year cost £750, the rent was £350, other fixed expenses amounted to

£550, the returns that year were 10 per cent. less than the outgoings. The landlord remitted 10 per cent. of that year's rent and lowered the rent £50 per annum. The returns for the second year were better than those of the year before in the proportion of 7 : 4. On the two years the farmer gained $23\frac{3}{4}$ per cent. What was his labour bill in the second year?

(941) A man who had spent on himself £600 a year for 5 years, and paid rates and taxes to the amount of £85 per annum, reduced his personal expenditure to £480 and was out of debt in 7 years. What was his income?

(942) A with £2500 capital joins in partnership with B, who has £4000 capital; at the end of a year's trading they have lost £520, and their capitals are diminished accordingly. C now joins them with £4500 capital. At the year's end they had gained £2358; what did each receive?

(943) Forty-five telegraph posts, placed at equal distances, extend a mile; how far apart are the posts?

Oxford
Exam. for
Women
over 18
years of
age, 1880.
943 to 953.

(944) How many articles at £3 7*s.* 6*d.* each are worth as much as 324 articles at £1 12*s.* 6*d.* each?

(945) Simplify $\frac{2597}{3445}+\frac{1\frac{3}{5}}{6\frac{1}{2}}$.

(946) Divide 25·6 by 16, 2·56 by ·16, and $\cdot\dot{0}\dot{9}$ by $\cdot 0\dot{4}$.

(947) Find the value of

$$\tfrac{4}{17}\text{ yard}+\tfrac{42}{20557}\text{ pole}+\tfrac{1}{1452}\text{ rood}+\tfrac{2}{30855}\text{ acre};$$

also of

$$\cdot 00008544921875 \text{ of a ton, and } \cdot 180\dot{5} \text{ of a guinea.}$$

(948) If 12 men or 15 women do a piece of work in 252 days, in what time can 11 men and 2 women do the same piece of work?

(949) Find the cost of papering a room eleven yards two feet four inches long, six yards two feet wide, five yards two feet six inches high, with paper one yard four inches wide, at threepence a yard.

(950) Sugar is bought at $1\frac{1}{4}$*d.* a lb., and sold at £18 13*s.* 4*d.* a ton; find the gain or loss per cent.

(951) Divide a sovereign between A, B, C, so that A may have fourpence more than B, and B tenpence more than C.

(952) A gives a fifth of a cake to B, and then a quarter of the remainder to C, and then a third of what still remains to D. What portions of the cake will A, B, C, D respectively have?

(953) Which is the better investment, a four per cent. stock at 120, or a five per cent. stock at $166\frac{2}{3}$?

(954) Find by practice or otherwise the cost of 6324 articles at £2 1*s.* $10\frac{1}{2}$*d.* each.

Oxford University Responsions, 1880. 954 to 966.

(955) Divide $12\frac{1}{10}$ by $3\frac{1}{18}$; and simplify

$$\frac{\frac{2}{5}+\frac{1}{4}-\frac{1}{12}+(\frac{1}{3}-\frac{2}{5})}{3-1\frac{4}{5}+\{(\frac{9}{5}\times\frac{1}{8})+\frac{7}{8}-\frac{9}{10}\}}$$

(956) Reduce £3 14*s.* 8*d.* to the fraction of £7.

Find the value of

$$1\frac{1}{6}\times 4\frac{1}{14}\times\frac{18}{19}\times\frac{2}{11} \text{ of 3 ac. 1 rood 30 po.}$$

(957) Multiply 613·24 by 45, and by ·000045.

Divide 555·0592 by 93·76.

(958) Reduce $\frac{8}{13}$ to a decimal, and $\cdot 1041\dot{6}$ to a fraction in its lowest terms.

(959) Reduce 15*s.* $7\frac{1}{2}$*d.* to the decimal of £5; and find the value of ·001 of £6 5*s.*

(960) Two thousand packets each 4 inches long, 3 inches broad, and 3 inches deep, are required to be packed in a box of which the inside dimensions are 4 ft. 3 in. in length, 3 ft. 4 in. in breadth, and 2 ft. 6 in. in depth. How many must be left out?

(961) Find the cost of papering a square room 17 ft. 4 in. long and 14 ft. 3 in. high with paper 1 ft. 7 in. in width, at 1*s.* 8*d.* per yd.

(962) Find the square roots of $1\frac{56}{169}$, and 998·56.

(963) If 16 men can do a piece of work in 12 days, working 7 hours a day, in how many days can 21 men do it, working 8 hours a day?

(964) Find the difference between the simple and the compound interest of £675 for 3 years at 5 per cent.

(965) What is the present worth of £399, due 4 years hence, at $3\frac{1}{2}$ per cent. per annum?

(966) A person holding £1250 five per cent. stock and £1900 six per cent., sold the former at 110 and the latter at 115, and laid out the proceeds in purchasing $4\frac{1}{2}$ per cent. stock at 89: what income did he gain or lose?

Cambridge University Previous Exam. 1880. 967 to 977.

(967) Find the greatest common measure of 2301 and 3717, and the least common multiple of 192, 204 and 272.

(968) Divide $3\frac{3}{14}-4\frac{7}{8}+1\frac{19}{24}$ by $1\frac{3}{8}+5\frac{17}{21}-7\frac{1}{24}$.

(969) A kilolitre contains 35·32 cubic feet, and a gallon contains 277·274 cubic inches; how many gallons are there in a kilolitre?

(970) Add together

$\frac{3}{5}$ of a guinea and a half, ·855 of a pound, and
$1\frac{7}{17}$ of $2\frac{3}{7}$ of $1\frac{3}{4}$ of 18*s.* $4\frac{1}{2}$*d.*

(971) Extract to three places of decimals the square roots of 6, and of $\cdot 2\dot{8}\dot{7}$.

(972) Find as recurring decimals the square of $\cdot\dot{4}$, and the square root of $\cdot 69\dot{4}$.

(973) Calculate the cost of paper for a room 18 ft. long, 16 ft. broad, and 12 ft. high, allowing 40 sq. ft. for doors and windows, the price of the paper being 2*s.* 4*d.* per piece of 12 yards long and 21 inches broad.

(974) A Cambridge Poor Rate, at 11*d.* in the pound, is made up of the Union Contribution $5\frac{1}{2}$*d.*; the Borough Rate 4*d.*; the Asylum &c. $1\frac{1}{2}$*d.* The rate on a certain property amounts to £100 8*s.* 5*d.*: how much of this is for the Borough Rate, and at what amount is the property assessed?

(975) Find the difference between the amount of £1205 put out for 2 years at 5 per cent. compound interest, and the present value of the same sum due 2 years hence, at 5 per cent. compound interest.

(976) The 11.45 Exeter express from Paddington stops first at Swindon, $77\frac{1}{2}$ miles distant, at 1.12. In the whole journey, 194 miles, 15 per cent. of the time is expended in stoppages &c.; at what time is the train due at Exeter?

(977) What income should be derived from investing £9350 in $5\frac{1}{2}$ per cent. preference stock at $137\frac{1}{2}$?

London University Matriculation, 1881. 978 to 983.

(978) Express $\sqrt{\frac{0{\cdot}0132 \times 0{\cdot}543}{7{\cdot}65 \times 0{\cdot}0301}}$ as a decimal fraction, correctly to three significant figures.

(979) Reduce $\frac{0{\cdot}\dot{9}\dot{0} \times 0{\cdot}\dot{8}4615\dot{3}}{0{\cdot}\dot{4}6153\dot{8} \times 0{\cdot}8\dot{3}}$ to its simplest form.

(980) Express $\frac{5}{8}$ of $\frac{11}{3}$ of $\frac{2}{7} + \frac{6}{5} \times \frac{1}{3} \div \frac{3}{4} - \frac{1}{30}$ of $31\frac{1}{7}$ as a vulgar fraction in its simplest form.

(981) A reduction of 20 per cent. in the price of beef would enable a purchaser to obtain 6 lbs. more for a sovereign. What is the reduced price?

(982) A ton of stone measures 13 cubic feet; what does a cubic metre weigh in kilogrammes?

(Assume one metre (linear) $= 39\frac{3}{8}$ inches; one kilogramme equals $2\frac{1}{5}$ pounds.)

(983) Water runs into a cistern by one pipe and from it by two, in each pipe at a uniform rate when the pipe is open. The cistern holds 1000 gallons. If all three pipes be open at once, the cistern, supposed full, would empty itself in 200 minutes. If one escape pipe and the supply pipe only be open, it would, if empty, fill in 200 minutes; but if the other escape pipe and the supply pipe be open, in 100 minutes. How long would it take the two escape pipes to empty the cistern if the supply pipe were closed?

(984) Find the difference, in pounds, between one million eight hundred and three thousand eight hundred and forty farthings, and one hundred and fifty thousand four hundred threepenny pieces.

Cambridge Junior Local, 1879. 984 to 995.

(985) Multiply 209 acres 3 roods 25 po. 3 yds. by 13, and divide 12 tons 3 cwt. 1 qr. 25 lbs. by 37.

(986) A bill of £9 8*s*. 10$\frac{1}{4}$*d*. has to be paid by several persons in equal shares; if 14 persons have together to pay £3 11*s*. 5$\frac{1}{2}$*d*., how many are there to share the cost?

(987) Two pieces of cloth of the same length cost £11 3*s*. 6*d*. and £14 8*s*. respectively; the price of the first was 6*s*. 2$\frac{1}{2}$*d*. per yard: what was the price of the other?

(988) Find, by practice, the cost of 369 miles 3 fur. 22 yds. of telegraph wire at £14 13*s*. 4*d*. per mile.

(989) Reduce $\frac{949}{1387}$ and $\frac{1081}{1311}$ to their lowest terms, and then find their difference.

(990) Find the value of $\frac{2}{7}$ of $\frac{21}{22}$ of £15 10*s*. 9*d*.$-\frac{7}{130}$ of $3\frac{1}{3}$ of $2\frac{11}{14}$ of £2 15*s*. 8*d*., and express the result as the fraction of half-a-crown.

(991) Convert $\frac{75}{128}$ and $\frac{6}{7}$ into decimals, and divide ·358307 by ·059.

(992) A train travels a certain distance in $4\frac{7}{12}$ hours at the rate of $16\frac{4}{5}$ miles an hour; how long would a train going at the rate of $19\frac{1}{4}$ miles an hour take to travel the same distance?

(993) Find the true discount on £600 15*s*. due $2\frac{1}{2}$ years hence at $4\frac{1}{2}$ per cent., and the simple interest on £500 for $8\frac{1}{4}$ years at $1\frac{1}{2}$ per cent.

(994) A room, 11 feet high, is half as long again as it is wide, and its cubical content is $4768\frac{1}{2}$ feet. Find its length and breadth.

(995) A man bought 63 sheep, and sold $\frac{4}{9}$ of them at a profit of 15 per cent.; $\frac{1}{7}$ at a profit of 50 per cent.; and the remainder at a loss of 25 per cent. What did he pay for the sheep if his gain was £3 17*s*. on the whole transaction?

(996) Find the greatest and least numbers of six digits which are exactly divisible by 789.

Cambridge Senior Local, 1879. 996 to 1008.

(997) The circuit of a racing path is $137\frac{1}{2}$ yards: how many times must a bicyclist go round to complete 5 miles?

(998) Which is the heavier, 1205 lumps of lead, each

weighing 2 tons 6 cwts. 2 qrs. 26 lbs. 7 ozs., or 2605 lumps, each weighing 1 ton 1 cwt. 2 qrs. 12 lbs. 6 ozs.? and by how much?

(999) Prove that the greatest common measure of two numbers is the least common multiple of all their common measures.

Find the G.C.M. of 929181 and 1012891.

(1000) Simplify

$$(a)\ 3\tfrac{1}{7}+3\tfrac{3}{10}+2\tfrac{3}{11}+2\tfrac{5}{22}+\tfrac{2}{35},$$

$$(b)\ 3\tfrac{1}{7}\times3\tfrac{3}{10}\times2\tfrac{3}{11}\times2\tfrac{5}{22}\times\tfrac{2}{35},$$

and reduce 18 days 5 hrs. 20 min. 40 sec. to the fraction of 31 days 21 hrs. 30 min. 10 sec.

(1001) Divide 24·109932 by 301·28, and find the value of ·90625 of a cubic yard.

Express as decimals $\frac{2}{21}$, $\frac{4}{33}$, $\frac{6}{35}$, and $\frac{8}{55}$, and find their sum.

(1002) A gold wreath, weighing 3 lbs. 7 ozs. 12 dwts., costs £255; if it is made of gold worth £3 17*s.* 6*d.* per oz., what is charged for manufacture?

(1003) Find the ratio of the rates for carriage on two railways, one of which charges 22*s.* 6*d.* for the carriage of 37½ cwts. 44 miles, and the other 31*s.* 6*d.* for the carriage of 48 cwts. 52½ miles.

(1004) Two wines, worth 32*s.* and 24*s.* per gallon respectively, are mixed together. If the mixture be worth 27*s.* 6*d.* per gallon, in what ratio are they mixed?

(1005) If the true discount on £127 18*s.* 6*d.* for 20 days be 3*s.* 6*d.*, find the rate per cent.

(1006) A retail tradesman professes to charge 10 per cent. above the wholesale price, but he has adulterated his goods with 50 per cent. of an inferior kind, which only costs $\frac{2}{5}$ of the price. What is his real rate of profit?

(1007) A and B are engaged in a work which must be finished in 6 days. A works 8 hours a day at first, and B 9 hours; after three days only $\frac{1067}{2261}$ of the work is done, each therefore works 1 hour a day more, and it is just finished in time. Compare the rates of working of A and B, and if the total sum paid for wages be £4 4*s.*, find how much each should receive.

(1008) A person who has £10257 10*s.* three per cent. stock calculates that by selling it and investing in $3\frac{1}{4}$ per cent. stock at $93\frac{1}{4}$ he can increase his annual income by £10 9*s.*; but before he can effect the exchange each stock rises $\frac{1}{4}$ per cent.: by how much is his income really increased?

Cambridge Junior Local, 1880. 1009 to 1020.

(1009) Add together two million three hundred thousand and forty pence, eight hundred and eight thousand sixpences, and ten million one hundred and thirty-five thousand nine hundred and fifty shillings. Express the answer in pounds.

(1010) Multiply 29 cwt. 0 qr. 16 lbs. by 24, and divide 944 cub. yds. 1 cub. ft. 1104 cub. inches by 59.

(1011) A man buys 497 sacks of potatoes for £339 1*s.* $11\frac{3}{4}$*d.*, and sells 248 sacks for 17*s.* $9\frac{1}{2}$*d.* per sack, the remainder he sells for 18*s.* $2\frac{1}{2}$*d.* per sack. Find his total gain.

(1012) Find the value of 100000 rupees in francs, 1 rupee being reckoned as worth 1*s.* $10\frac{1}{2}$*d.*, and 25 francs as worth £1.

(1013) Find by practice the cost of 16 oz. 6 dwts. 20 grs. of gold at £3 17*s.* 6*d.* per oz.

(1014) Reduce to a fraction in its lowest terms

$$\tfrac{1}{3}+\tfrac{3}{8}+\tfrac{2}{5}+\tfrac{5}{12}+\tfrac{3}{7};$$

divide $\frac{2}{3}$ of $4\frac{1}{2}$ by $\frac{4}{13}$ of $3\frac{1}{4}$, and 12·9729 by 312·6.

(1015) Add together $\frac{5}{7}$ of a guinea, $\frac{3}{5}$ of a sovereign, $\frac{7}{20}$ of a crown, and $\frac{1}{4}$ of a shilling. Express the result as the fraction of $4\frac{7}{20}$ of £1.

(1016) Reduce 2 ft. 6 inches to the decimal of a yard, and find the number of pence in ·025 of £1.

(1017) A sum of £50000 for drainage purposes has to be raised by rate from four townships, A, B, C, and D. A is rated at £175002, B is rated at £82434, C is rated at

£22116, and D is rated at £20448. How much in the pound must the rate be, and how much must each contribute?

(1018) Distinguish between interest and discount.

Find the discount on £929 10*s*. due $2\frac{1}{4}$ years hence at $2\frac{1}{2}$ per cent. simple interest.

(1019) £3600 of $3\frac{1}{2}$ per cent. stock is purchased for £3519. What is the price of the stock, and what income would thence be derived?

(1020) The area of a rectangular field contains 975744 square feet; one of the sides is $3\frac{1}{2}$ times as long as the other: what is the length of each side?

Cambridge Senior Local, 1880. 1021 to 1032.

(1021) Find the quotient and remainder arising from the division of 359907 by 789.

If in dividing a number by 336 the operation be performed by short division by employing the factors 6, 7, 8 in succession, and the several remainders be 1, 2, 3, what is the complete remainder?

(1022) If a person's income for the year 1880 be £37 15*s*. per calendar month, and he spend at the rate of £1 4*s*. $7\frac{1}{2}$*d*. per day, how much will he have left at the end of the year?

(1023) If 44 yards 1 ft. 9 inches of cloth cost £42 7*s*. 9*d*. what will be the cost of 74 yds. 11 inches?

(1024) Simplify

(1) $\frac{2}{3}\frac{3}{6}\frac{7}{7}\frac{6}{2}\frac{5}{8}\frac{5}{5}$.

(2) $\dfrac{\frac{1}{2}+\frac{1}{4}+\frac{1}{7}+\frac{1}{14}+\frac{1}{28}}{\frac{1}{2}+\frac{3}{4}+\frac{6}{7}+\frac{13}{14}+\frac{27}{28}}$.

Reduce 22 days 4 hrs. 35 min. 42 sec. to the fraction of 34 days 20 hrs. 56 min. 6 sec.

(1025) Divide

(i) 121·9192 by 3·04.

(ii) 12·19192 by 30·4.

Find the value of ·07890625 of a ton, and simplify

$$1\tfrac{2}{3} \text{ of } \frac{\cdot 5\dot{3}}{\cdot 6\dot{1}} \text{ of } \frac{\cdot 825}{\cdot 41\dot{6}}.$$

(1026) Find by practice the cost of

(i) 4112 things at £1 1*s.* 7¼*d.* each.

(ii) 3 acres 1 rood 3 poles 19¼ sq. yds. at £110 per acre.

(1027) The breadth of a room is half as much again as its height; its length is twice its height: it costs £5 5*s.* to paint its walls at 1¼*d.* per square foot: what are its dimensions?

(1028) Three men can do as much as 5 boys; the wages of 3 boys are equal to those of 2 men. A work on which 40 boys and 15 men are employed takes 8 weeks and costs £350: how long would it take if 20 boys and 20 men were employed, and how much would it cost?

(1029) A walks to a place at the rate of 4½ miles per hour; at 8 miles from his destination he meets B, and turns back with him (walking at B's rate) for a mile; if A is half an hour late at his destination, what is B's rate, and at what rate should A have walked after parting with B so as to arrive at the proper time?

(1030) If the difference between the interest and discount on a sum of money for 2 months at 4½ per cent. be 2*s.* 3*d.*, find the sum.

(1031) If, when the price of the 3 per cent. stock be 96, a person can obtain an annual income of £1 more than he can if the price be 97, how much has he to invest?

(1032) In an election A receives promises from half the constituency, B from $\frac{19}{40}$; 400 voters, however, had promised both candidates, of whom 300 vote eventually for B and 100 for A. The electors who had not promised either do not vote. B wins by 80 votes. What were the numbers for each?

Oxford Junior Local, 1880. 1033 to 1044. Preliminary.

(1033) Write nine hundred and nine millions ninety-nine thousand in figures, and 1010010001 in words.

(1034) A tank contains 11987 gallons of water. How many casks holding 29 gallons each can be filled from it, and how many gallons will be left in it when they are full?

(1035) Multiply £237 4*s.* 9*d.* by 111; and divide 75 miles 1 fur. 39 po. 3 yds. by 75.

(1036) Reduce 13 tons 6 cwt. 3 qrs. 24 lbs. 10 oz. 7 dr. to drams.

(1037) Add together $\frac{6}{11}$, $6\frac{1}{11}$, and $\frac{6}{11}$ of $6\frac{1}{11}$; and express 3 quarts 1 pint as the fraction of 3 bushels 1 peck.

(1038) Divide ·0003 by ·000005; multiply $\cdot 01\dot{6}$ by ·3; and find the value of ·00025 of £100.

(1039) If 54 horses cost £3600, how much will 42 cost?

(1040) If a field containing 5 acres 1 rood produce 28 quarters of wheat, what is the area of a field which produces 100 quarters?

Extra.

(1041) How many bricks are there in a stack which measures 36 ft. long, 9 ft. wide, and 12 ft. high, each brick measuring 9 in. by $4\frac{1}{2}$ in. by 3 in.?

(1042) Two elephants and four horses can do a piece of work in $7\frac{1}{7}$ hours, and a single elephant can do it all in 20 hours. How long will a single horse take in doing it?

(1043) Divide the number 702 into three parts proportional to 2, 3, and 4.

Also divide the same number into three parts proportional to $\frac{1}{2}$, $\frac{1}{3}$, and $\frac{1}{4}$.

(1044) Find in what time the simple interest on £375 at 4 per cent. per annum will amount to £91 5*s.*

Oxford Senior Local, 1880. 1045 to 1055.

(1045) Write out the tables of Long and Square Measure; and multiply 4 acres 1 rood 27 poles 19 yards 4 ft. 72 inches by 27.

(1046) If 6 dozen table spoons weigh 11 lbs. 6 oz. 12 dwts. and the same number of tea spoons weigh 3 lbs. 7 oz. 10 dwts., what is the difference in weight between a table spoon and a tea spoon?

(1047) An order for books to the value of £35 15*s.* 4*d.* is subject to a reduction of 1*s.* 3*d.* in the pound. What is the net sum to be paid?

(1048) Simplify (1) $\frac{1160}{1624}$, and (2) 5 of $12\frac{3}{4} \div 2\frac{1}{16}$.
Divide £219 9*s.* 7*d.* by $12\frac{2}{7}$.

(1049) Reduce $\frac{11}{48}$ to a decimal, and ·015625 to a vulgar fraction.

Divide 1·44 by 2·5; and 1440 by ·025.

(1050) Find the value of

$$3\tfrac{19}{960} \text{ of } £1 + 1\cdot1\dot{6} \text{ of } 10s.\ 6d.$$

(1051) Reduce 2 lbs. 3 oz. 5 dwts. 6 grs. to the decimal of 3 lbs. Troy.

(1052) Extract the square root of 11883·1801, and find the cube of the number whose square is 256.

(1053) Find the simple interest upon £1684 3*s.* 4*d.* in $2\frac{1}{2}$ years at $4\frac{1}{4}$ per cent.

(1054) If 7 cwts. 3 qrs. 22 lbs. of potatoes cost £4 3*s.* $5\frac{1}{4}$*d.*, what is the cost of half a ton?

(1055) Twelve men are engaged to do a piece of work which they would complete by working 8 hours a day for 14 days; and when half the work is done eight of the men leave. In what number of days will the rest be able to complete it, if they work $10\frac{1}{2}$ hours each day?

Oxford Junior Local, 1881. 1056 to 1067.

(1056) Express in words 90999090009; and in figures two thousand millions four hundred thousand and sixty.

(1057) Multiply 810901 by 809101; and 1 ton 0 cwt. 0 qr. 5 lbs. by 449.

(1058) Divide 25600160001 by 159601; and £183 12*s.* $1\frac{1}{2}$*d.* by 58.

(1059) A field containing 18 acres 36 poles is divided into allotments each containing 1 rood 14 poles. How many of them are there?

(1060) Reduce 28 qrs. 5 bushels 1 peck 1 gallon to pints.

(1061) Simplify $\dfrac{3\frac{1}{7} - \frac{2}{3}}{\frac{4}{49} \times 7\frac{7}{12}}$; and divide ·00036 by ·006.

(1062) Express 2 yards 3 inches as the fraction of 1 mile 30 perches.

(1063) If it cost £9 5*s.* 4*d.* to carpet a room whose floor contains 278 square feet, how many square feet are there in one which can be carpeted for £12 4*s.* 8*d.*?

(1064) Find the simple interest on £11000 for 4·4 years at 3·15 per cent.

Extra.

(1065) The external length, breadth, and depth of a box are 6 ft. 2 in., 3 ft. 8 in., and 2 feet respectively, and it is made of wood one inch thick. Find the quantity used.

(1066) Two pipes running together can fill a cistern in 8 minutes, and one of them alone can fill it in 24 minutes. How long would the other alone take?

(1067) If 12 men working 8 hours a day do $\frac{4}{5}$ of a piece of work in 20 days, how many days will 15 men working 10 hours a day take to do $\frac{7}{8}$ of it?

(1068) How many times is £27 15*s.* 7$\frac{3}{4}$*d.* contained in £1356 6*s.* 9*d.*? and how much remains over?

Oxford Senior Local, 1881. 1068 to 1078.

(1069) Multiply 1 acre 3 roods 7 poles 4 yards by 17.

(1070) Add together $3\frac{5}{14}$, $5\frac{4}{21}$, $\frac{11}{24}$, and $1\frac{1}{3}$ of $\frac{5}{56}$.

(1071) In a row of 25 houses, each house has 17 windows, each window 4 panes, and each pane measures 18 inches by 9 inches. What will be the cost of glazing all these windows at 6*d.* per square foot?

(1072) Multiply 47·625 by ·128; divide 1·05 by ·875; and find the value of

$$\frac{(1{\cdot}005+{\cdot}201)\times(1{\cdot}005-{\cdot}201)}{1{\cdot}005\times{\cdot}201}.$$

(1073) Reduce £5 17*s.* 7$\frac{1}{2}$*d.* to the decimal of £100; and find the value of ${\cdot}7\dot{0}\dot{9}$ of 5 tons 3 cwts. 14 lbs.

(1074) Find the cost of 227 tons 15 cwts. 21 lbs. at £12 13*s.* 4*d.* per ton.

(1075) Extract the square root of 36180225, and of ·000144.

(1076) Find the simple interest and amount of £225 13*s.* 4*d.* for 2$\frac{1}{2}$ years at 4$\frac{3}{4}$ per cent. per annum.

(1077) If the value of 47 lbs. 1 oz. of silver be £184 16*s.* 0½*d.*, what is the value of 84 lbs. 9 oz. ?

(1078) If 27 men mow a field of 90 acres in 7 days, working 8 hours a day, how many men will be required to mow 200 acres in 16 days if they will work 10 hours a day ?

ANSWERS.

SIMPLE ADDITION.

(1) 978962041. (2) 11812274. (3) 209063710.
(4) 21044. (5) 20669439. (6) 5263704.
(7) 101038. (8) 70310438. (9) 31101132.
(10) 2896599. (11) 457709135.

SIMPLE SUBTRACTION.

(1) 24183803. (2) 10037378. (3) 31060158.
(4) 2285738519. (5) 557842678. (6) 1102040110.
(7) 918994996. (8) 399595996. (9) 1210999.
(10) 31434799. (11) 89497336. (12) 9005102.
(13) 998945. (14) 3630. (15) 80013678.
(16) 26502847. (17) 4984. (18) 24986
(19) 194084. (20) 99593496. (21) 947997.

SIMPLE MULTIPLICATION.

(1) 92021028. (2) 14284640000. (3) 6247550280.
(4) 7313243616. (5) 25164172968992. (6) 27315233489$\frac{5}{\text{[illegible]}}$.
(7) 1418305731$\frac{5}{11}$. (8) 6974285085$\frac{4}{7}$. (9) 13371882336.
(10) 837018144. (11) 166363531200. (12) 72642735.
(13) 28768029. (14) 440956790820. (15) 173367270.
(16) 188019972. (17) £31709. (18) 390 miles and 65 miles.

SIMPLE DIVISION.

(1) 7146754924$\frac{4}{5}$. (2) 4511586$\frac{45}{81}$. (3) 135212227$\frac{34}{54}$.
(4) 707594$\frac{770}{2197}$. (5) 410602$\frac{121}{158}$. (6) 2147$\frac{11}{15}$.
(7) 7083$\frac{15}{99}$. (8) 6001$\frac{23}{42}$. (9) 55721188$\frac{156}{467}$.
(10) 818938$\frac{6}{9}$. (11) 29030852$\frac{7}{13}$. (12) 7982512$\frac{72}{85}$.
(13) 7126$\frac{45}{123}$. (14) 668$\frac{474652}{827014}$. (15) 94567.
(16) 5655$\frac{228}{321}$. (17) 814021 families and £6 over.
(18) 625 minutes or 10 hours 25 min.

Miscellaneous Questions on the Simple Rules.

(1) 89088; 88576; 22740992; 347. (2) 660. (3) 97.
(4) 1219941. (5) 9$\frac{45}{72}$. (6) 147. (7) 865. (8) 942.
(9) 464. (10) 11504703. (11) 589182. (12) 317450.

REDUCTION.

(1) 113048. (2) 2572552. (3) 18648. (4) 45480.
(5) 1077072. (6) 19644. (7) 749. (8) 143.
(9) 183492$\frac{1}{4}$ yds. (10) £5632 14*s.* 6$\frac{1}{5}$*d.*
(11) 3517 crowns 0*s.* 11$\frac{3}{4}$*d.* $\frac{1}{5}$. (12) 16250 hf.-crowns 1*s.* 4$\frac{3}{4}$*d.*
(13) 248 moid. 7*s.* 3*d.* (14) 5419 cwt. 2 qrs. 16 lbs. 5 oz.
(15) 2A. 1R. 20P. (16) 45011752 fourpenny pieces and 2*d.* over.
(17) 15078504 sixpences. (18) 1136461 threepenny pieces and 1*d.* over.
(19) 5020 guineas. (20) £343 7*s.* (21) 262 Eng. ells.
(22) 592 yds. 3 qrs. (23) 1223 Fl. ells 1 qr.
(24) 34829; 84; 7560; 152 farthings.
(25) 15 miles 6 fur. 10 poles 2 yds. 2 ft. 4 in.
(26) 4 cwt. 2 qrs. 9 lbs. 2 oz. (27) 5250 lbs. Troy.
(28) 999000 grains. (29) 55 cwt. 3 qrs. 6 lbs.
(30) 57223 farthings and 57223 lbs.
(31) 3720 farthings and 29 lbs. 1 oz. weight.

COMPOUND ADDITION.

(1) £205 3*s.* 10*d.* (2) 462 lbs. 9 oz. 14 dwts.
(3) 193 miles 2 fur. 20 poles 0 yds. 2 ft. 4 in.
(4) 2333 yds. 1 qr. 1 nl. (5) 2596 roods 5 poles.
(6) £338 12*s.* 6$\frac{1}{4}$*d.* (7) £41 14*s.* 0$\frac{3}{4}$*d.* (8) 180 yds. 0 qr. 3 nls
(9) £645 6*s.* 11$\frac{1}{4}$*d.* (10) £435 8*s.* 6*d.* (11) £117 6*s.* 1$\frac{1}{4}$*d.*
(12) £669 2*s.* 3$\frac{3}{4}$*d.*

COMPOUND SUBTRACTION.

(1) £580 6*s.* $6\frac{1}{2}$*d.* (2) £88 7*s.* $9\frac{3}{4}$*d.*
(3) 1460 miles 6 fur. 35 poles 4 yds. (4) 28 lbs. 9 oz. 2 dwts. 16 grs.
(5) 28 oz. 18 dwts. 21 grs. (6) 36 perches $29\frac{1}{4}$ yds. 8 sq. ft. 94 sq. in. or 36 perches 30 sq. yds. 1 sq. ft. 130 sq. in. (7) 1708 yds. 0 ft. 4 in.
(8) 1 guinea 20*s.* 11*d.* (9) 6 bush. 3 pks. 1 gal. 3 qts. 1 pt.
(10) £1 0*s.* $0\frac{1}{4}$*d.* (11) £200. (12) £1 10*s.* 2*d.*
(13) £31 11*s.* $3\frac{1}{2}$*d.*; he will just be able to pay. (14) 415 yds. 0 qrs. 2 nls.
(15) 1A. 1R. 7P. $17\frac{1}{4}$ sq. yds. 2 sq. ft. 134 sq. in., or 1A. 1R. 7P. 17 sq. yds. 5 sq. ft. 26 sq. in. (16) £4 3*s.* 11*d.* (17) £13 1*s.* $8\frac{1}{4}$*d.*
(18) *D*'s portion = 1A. 3R. 23P. $17\frac{1}{2}$ sq. yds.

COMPOUND MULTIPLICATION.

(1) £8078 19*s.* $9\frac{3}{4}$*d.* (2) 59 cwt. 1 qr.
(3) 257 miles 5 fur. 31 poles. (4) £1646 10*s.* $3\frac{3}{4}$*d.*
(5) 35418 lbs. 8 oz. 8 dwts. 19 grs. (6) £269664 2*s.* $10\frac{1}{4}$*d.*
(7) 9399 miles 1 fur. 8 poles. (8) 13067 cwt. 2 qrs. 25 lbs. 8 oz.
(9) £50 12*s.* 4*d.* (10) £26583 0*s.* $8\frac{8}{9}$*d.*
(11) 157 lbs. 4 oz. 13 dwts. 8 grs. (12) £1312 12*s.* $7\frac{1}{2}$*d.*
(13) £11 12*s.* 9*d.* (14) 11A. 2R. 16 per. $3\frac{1}{2}$ sq. yds.
(15) £7 15*s.* $2\frac{1}{2}$*d.* gain. (16) £123 4*s.* 7*d.* (17) £10 7*s.* 11*d.*
(18) 1336 miles 3 fur. 26 poles 5 yds.

COMPOUND DIVISION.

(1) £24 17*s.* $9\frac{3}{4}$*d.* (2) 7 cwt. 2 qrs. 27 lbs. (3) 19A. 2R. 24P.
(4) 10 oz. 13 dwts. 9 grs. (5) 6 fur. 3 yds. $2\frac{1}{3}$ ft. (6) £57 12*s.* $8\frac{1}{2}$*d.*
(7) 2 fur. 35 poles 0 yd. 1 ft. $8\frac{155}{872}$ in. (8) 1 lb. 1 oz. 18 dwts. $16\frac{127}{154}$ grs.
(9) £100. (10) 2 tons 6 cwt. 0 qrs. 26 lbs. (11) 3A. 1R. $13\frac{35}{71}$P.
(12) 56 times. (13) 87 times. (14) 129 times.
(15) 9 fields. (16) $5\frac{8609}{17218}$ or $5\frac{1}{2}$. (17) 15 yds. 0 qrs. $2\frac{4}{9}$ nls.
(18) 9 times. (19) 4 fur. 8 poles $3\frac{23}{35}$ yds. (20) 68 persons in all.
(21) 182 trees. (22) 7128 panes.
(23) 235 crs. + 57 hf.-sovs. + 121 shils. + 1452 fourpenny pieces = 1565 coins in all. (24) £1 2*s.* 6*d.* (25) In 9 hrs'. time, i. e. 6 P.M.
(26) 3 dwts. $8\frac{19}{40}$ grs. (27) £98 2*s.* $4\frac{1}{2}$*d.* (28) 2*s.* 3*d.* each thaler.

BILLS OF PARCELS.

(1) £6 18*s.* 9*d.* + £1 0*s.* 1$\frac{1}{2}$*d.* + £3 6*s.* + 18*s.* 4*d.* = £12 3*s.* 2$\frac{1}{2}$*d.*
(2) 4*s.* 2*d.* + £1 2*s.* + 10*s.* 8*d.* + 5*s.* 9*d.* + 3*s.* 9*d.* + 8*s.* 3*d.* = £2 14*s.* 7*d.*
(3) £3 11*s.* 3*d.* + £1 4*s.* 6*d.* + 8*s.* 6*d.* + 3$\frac{1}{2}$*d.* + 5*s.* 7$\frac{1}{2}$*d.* = £5 10*s.* 2*d.*

SIMPLE PROPORTION.

(1) 181A. 1R. 30$\frac{2}{5}$P. (2) 1*s.* 7$\frac{1}{4}$*d.* (3) 213$\frac{1}{5}$ lbs. of coffee.
(4) £337 19*s.* 4$\frac{1}{2}$*d.* (5) 4 lbs. 1 oz. 9$\frac{119}{125}$ dwts. (6) £2 6*s.* 8$\frac{1879}{5459}$*d.*
(7) 18 yds. (8) £631 10*s.* (9) £3 10*s.* 0$\frac{21}{32}$*d.*
(10) 15*d.* in the £. (11) 5$\frac{125}{311}$*d.* (12) £19 14*s.* 1$\frac{1}{2}$*d.*
(13) £2500. (14) 8 days. (15) 23 Nap. 12 fr. 50 cents. = £18 15*s.* Therefore money spent = £23 12*s.* 6*d.* − £18 15*s.* = £4 17*s.* 6*d.*
(16) 135 francs. (17) 4$\frac{1}{4}$*d.* per lb. (18) 41$\frac{7}{23}$ mls. per hour.
(19) £106 3*s.* 3$\frac{33}{73}$*d.*

COMPOUND PROPORTION.

(1) £154 3*s.* 4*d.* (2) 20$\frac{1980}{3101}$ hours. (3) 11 days.
(4) 15 men. (5) 28 horses. (6) £150.
(7) £8. (8) £55 10*s.* (9) 90 navvies.
(10) £50. (11) £35. (12) £26 10*s.*
(13) 5$\frac{1}{3}$ days. (14) £50. (15) 48 lines.

PRACTICE.

(1) £301 11*s.* 3*d.* (2) £214 1*s.* 6$\frac{3}{4}$*d.* (3) £409 0*s.* 8*d.*
(4) £17 6*s.* 6*d.* (5) £25 15*s.* 4$\frac{1}{2}$*d.* (6) £265 1*s.*
(7) £207 8*s.* 10*d.* (8) £814 17*s.* 6$\frac{5}{16}$*d.* (9) £80 1*s.* 3*d.*
(10) £783 9*s.* 0$\frac{1}{2}$*d.* (11) £207 10*s.* 8$\frac{15}{16}$*d.* (12) £3691 2*s.* 3*d.*
(13) £234 14*s.* 0$\frac{7}{8}$*d.* (14) £90 7*s.* 10$\frac{1}{4}$*d.* (15) £39 13*s.* 11$\frac{5}{8}$*d.*
(16) £1033 0*s.* 11$\frac{1}{8}$*d.* (17) £534 13*s.* 3$\frac{3}{4}$*d.* (18) £25867 12*s.* 6*d.*
(19) £3640 12*s.* 6*d.* (20) £1110 17*s.* 8$\frac{3}{4}$*d.*
(21) £300374 2*s.* 6$\frac{39}{40}$*d.* (22) £30296 6*s.* 8*d.* (23) £33149 3*s.*
(24) £3 18*s.* 6$\frac{5}{7}$*d.* (25) £281 4*s.* 5$\frac{7}{10}$*d.* (26) £19 3*s.* 0$\frac{3}{7}$*d.*
(27) £6 11*s.* 8$\frac{27}{56}$*d.* (28) £618 8*s.* 1$\frac{1}{7}$*d.* (29) £284 8*s.* 8$\frac{5}{8}$*d.*

PRACTICE—*continued.*

(30) £313 3*s*. 3*d*. (31) £9 17*s*. $1\frac{77}{144}$*d*. (32) £240 12*s*. $6\frac{597}{968}$*d*.

(33) £468 15*s*. (34) £245 5*s*. 5*d*. (35) £86 11*s*. $4\frac{7}{32}$*d*.

(36) £34 6*s*. $8\frac{5}{8}$*d*. (37) £3409 4*s*. $0\frac{9}{32}$*d*. (38) £340 12*s*. $9\frac{3}{4}$*d*.

(39) £13 11*s*. $1\frac{1}{4}$*d*. (40) 32 qrs. 6 bus. $3\frac{11}{16}$ pks.

(41) 19 miles 7 fur. 29 poles 5 yds. 0 ft. $7\frac{1}{8}$ in. (42) £33 15*s*.

(43) £5905 9*s*. $9\frac{21}{40}$*d*. + £5871 18*s*. $10\frac{163}{320}$*d*. = £11777 8*s*. $8\frac{11}{320}$*d*.

(44) £22 12*s*. $8\frac{8}{11}$*d*. (45) £316 11*s*. $7\frac{11}{16}$*d*.

(46) £2 6*s*. 9*d*. + 18*s*. $6\frac{3}{4}$*d*. + £1 14*s*. $1\frac{1}{2}$*d*. + £1 7*s*. 6*d*. = £6 6*s*. $11\frac{1}{4}$*d*.

SIMPLE INTEREST.

(1) £17 17*s*. 9*d*.; £415 7*s*. 9*d*. (2) £12 0*s*. $1\frac{89}{100}$*d*.; £448 13*s*. $1\frac{89}{100}$*d*.

(3) £128 12*s*. 6*d*.; £741 2*s*. 6*d*. (4) £40 13*s*. $4\frac{1}{2}$*d*.; £492 10*s*. $10\frac{1}{2}$*d*.

(5) £3 8*s*. $0\frac{87}{160}$*d*. (6) £4 18*s*. $9\frac{797}{960}$*d*. (7) £124 6*s*. 3*d*.

(8) £3 12*s*. $1\frac{1543}{3650}$*d*. (9) £20 11*s*. $10\frac{62}{73}$*d*. (10) £3 12*s*. $11\frac{113}{365}$*d*.

(11) £458 13*s*. $10\frac{2}{73}$*d*. (12) £208 10*s*. $10\frac{38}{73}$*d*. (13) £1154 11*s*. $5\frac{7}{73}$*d*.

(14) £612 10*s*. (15) £250. (16) £175.

(17) £325 16*s*. 8*d*. (18) £3 per cent. (19) £5 per cent.

(20) 5 years. (21) $4\frac{1}{2}$ years. (22) £56 5*s*.

(23) £3200. (24) £$3\frac{4}{7}$ or £3 11*s*. $5\frac{1}{7}$*d*. per cent.

(25) £829 10*s*. (26) £1968 15*s*. (27) £1 4*s*. $8\frac{64}{331}$*d*. per cent.

(28) £2600. (29) £225 loss.

COMPOUND INTEREST.

(1) £52 10*s*. $1\frac{559}{3125}$*d*.; £473 0*s*. $1\frac{559}{3125}$*d*. (2) £37 7*s*. $5\frac{347}{800}$*d*.; £397 7*s*. $5\frac{347}{800}$*d*.

(3) £347 14*s*. $4\frac{25}{32}$*d*. − £337 10*s*. = £10 4*s*. $4\frac{25}{32}$*d*. difference.

(4) £881 4*s*. $10\frac{7}{80}$*d*. (5) £1458 12*s*. $1\frac{4}{5}$*d*.

(6) £11 5*s*. and £11 12*s*. 7*d*.

BANKERS' OR MERCANTILE DISCOUNT.

(1) Bankers' discount = £6 14*s*. $1\frac{1}{5}$*d*.; Rep. P. W. = £663 15*s*. $10\frac{4}{5}$*d*.

(2) Banker retains £1 10*s*. $2\frac{34}{73}$*d*.; and I receive £348 9*s*. $9\frac{39}{73}$*d*.

(3) Common discount = £1 5*s*. $5\frac{988}{1825}$*d*.

(4) Banker retains £2 11*s*. $8\frac{52}{73}$*d*.; and he pays £397 8*s*. $3\frac{21}{73}$*d*.

(5) He will receive £358 15*s*. $10\frac{2}{73}$*d*.

(6) By keeping the bill 3 months I shall gain £1 2*s*. $5\frac{1}{10}$*d*.

TRUE DISCOUNT.

(1) £1423 14*s*. $6\frac{54}{59}d$. (2) £404 19*s*. $3\frac{81}{89}d$.
(3) £148 10*s*. $3\frac{57}{101}d$. (4) £358 9*s*. $0\frac{11436}{14663}d$.
(5) B. D. = £138 12*s*. $10\frac{292}{365}d$.; T. D. = £135; diff. = £3 12*s*. $10\frac{292}{365}d$.
(6) T. D. = £23 2*s*. $4\frac{1}{2}d$.; but the Banker would really take £23 16*s*. $2\frac{191}{200}d$. Therefore the banker gains 13*s*. $10\frac{91}{200}d$.
(7) £448 14*s*. $11\frac{601}{18301}d$.
(8) B. D. = £4 4*s*.; T. D. = £4 3*s*. $7\frac{31}{163}d$. Banker's gain = $4\frac{132}{163}d$.
(9) By selling for cash he will lose £150.
(10) £29 11*s*. $1\frac{121}{203}d$. + £29 2*s*. $6\frac{30}{103}d$. = £58 13*s*. $7\frac{18563}{20909}d$.
(11) £4 per cent. (12) £6571 7*s*. $6\frac{90}{807}d$.

VULGAR FRACTIONS.

I. The greatest Common Measure—
(1) 729. (2) 677. (3) 59. (4) 117. (5) 27. (6) 189. (7) 77.

II. The least Common Multiple—
(1) 36. (2) 360. (3) 144. (4) 1260. (5) 55692.
(6) 2310. (7) £10 10*s*.

III. Reduction of an Integer or Mixed Number to an Improper Fraction—
(1) $\frac{554}{9}$. (2) $\frac{2110}{19}$. (3) $\frac{7778}{77}$. (4) $\frac{9}{1}$.
(5) $\frac{2812}{76}$. (6) $\frac{9802}{99}$. (7) $\frac{815}{12}$. (8) 133.

IV. Reduction of Improper Fractions to Integers or Mixed Numbers—
(1) $111\frac{1}{9}$. (2) 46. (3) $258\frac{265}{375}$. (4) $200\frac{216}{999}$. (5) $1031\frac{34}{67}$.
(6) $991\frac{9}{101}$. (7) $12\frac{2}{3}$ stones.

V. Reduction of Fractions to Lowest Terms—
(1) $\frac{3}{11}$. (2) $\frac{68}{123}$. (3) $\frac{263}{277}$. (4) $\frac{741}{979}$. (5) $\frac{295}{304}$. (6) $\frac{29}{31}$. (7) $\frac{43}{44}$.

VI. Reduction of Compound Fractions to Simple Fractions—
(1) $11\frac{9}{10}$. (2) $\frac{5}{18}$ (3) $2\frac{5}{8}$. (4) $2\frac{8}{45}$. (5) $4\frac{4}{21}$. (6) $\frac{3}{7}$.

VII. Multiplication and Division of Concrete quantities—
(1) £29 10*s*. $4\frac{2}{7}d$. (2) £54 17*s*. $5\frac{4}{9}d$. (3) £34 9*s*. 4*d*.
(4) 31 cwt. 1 qr. $22\frac{3}{5}$ lbs. (5) 1 lb. 10 oz. 16 dwts. $8\frac{1}{3}$ grs.
(6) 130 mls. 5 fur. 30 poles. (7) 10 c. yds. 6 c. ft. $394\frac{4}{11}$ c. in.
(8) £6 5*s*. $5\frac{5}{9}d$. (9) £12 17*s*. $5\frac{114}{125}d$. (10) £3 2*s*. $8\frac{451}{840}d$.
(11) 1 mile 2 fur. $33\frac{92}{105}$ poles. (12) 7 oz. 7 dwts. $3\frac{419}{535}$ grs
(13) 2 cub. ft. $912\frac{83}{504}$ cub. in.

VIII. Reduction of Fractions to their Least Common Denominator—

(1) $\dfrac{80,\ 90,\ 100,\ 105,\ 108}{120}$. (2) $\dfrac{30,\ 36,\ 30,\ 140}{45}$.

(3) $\dfrac{153,\ 96,\ 112,\ 6}{36}$. (4) $\dfrac{9,\ 600,\ 20,\ 504}{180}$.

(5) $\dfrac{1080,\ 1120,\ 1134,\ 1155,\ 945}{1260}$.

(6) $\dfrac{2800,\ 3570,\ 4368,\ 5180,\ 6000,\ 6825}{840}$.

(7) $\dfrac{15,\ 15}{20}$. (8) $\dfrac{25,\ 21}{35}$. (9) $\frac{3}{5}$ the greater.

(10) $\frac{3}{7}$ the greater. (11) $\frac{13}{15}, \frac{5}{6}, \frac{3}{5}$. (12) $\dfrac{135,\ 144,\ 140}{180}$.

IX. Addition—

(1) $\frac{14}{15}$. (2) $7\frac{493}{840}$. (3) 5. (4) $9\frac{10}{21}$. (5) $6\frac{53}{56}$.
(6) $22\frac{2}{3}$. (7) $31\frac{1}{30}$. (8) $6\frac{119}{120}$. (9) $163\frac{2}{27}$.
(10) £148 19*s*. $5\frac{32}{63}$*d*. (11) 1 oz. 4 dwts. $14\frac{1}{3}$ grs.
(12) 12 miles 1 fur. $33\frac{25}{72}$ poles.

X. Subtraction—

(1) $3\frac{54}{55}$. (2) $1\frac{7}{90}$. (3) $12\frac{5}{8}$. (4) $13\frac{5}{8}$. (5) $8\frac{16}{21}$.
(6) $1\frac{7}{9}$. (7) $\frac{9}{25}$. (8) $\frac{7}{90}$. (9) $1\frac{7}{24}$. (10) $9\frac{59}{60}$.
(11) $2\frac{2}{33}$. (12) 9*s*. $10\frac{10}{21}$*d*. (13) £4 18*s*. $10\frac{103}{112}$*d*.
(14) £3 17*s*. $4\frac{44}{45}$*d*. (15) $1\frac{11}{24}$.

XI. Multiplication—

(1) 100. (2) $2\frac{170}{231}$. (3) 415. (4) 30. (5) $\frac{9}{125}$.
(6) $61\frac{1}{2}$. (7) $\frac{29}{84}$. (8) $9\frac{1}{63}$. (9) $17\frac{7}{8}$.
(10) $4\frac{427}{512}$ cub. ft. (11) $625\frac{31}{36}$ sq. ft. in walls; $176\frac{15}{52}$ sq. ft. in floor.

XII. Division—

(1) $\frac{3}{8}$. (2) $7\frac{1}{3}$. (3) $1\frac{5}{21}$. (4) $51\frac{3}{7}$. (5) $\frac{2}{15}$.
(6) $\frac{5}{81}$. (7) $8\frac{28}{55}$. (8) $1\frac{4}{5}$. (9) $\frac{161}{1716}$. (10) $1\frac{1}{3}$.
(11) 7. (12) £2 17*s*. $2\frac{6}{7}$*d*. (13) 1 cwt. 2 qrs. $17\frac{75}{77}$ lbs.
(14) $1\frac{26}{35}$. (15) 2. (16) $\frac{1}{8}$. (17) $2\frac{93}{118}$. (18) $\frac{21}{116}$.

XIII. Simplification—

(1) $\frac{95}{737}$. (2) 76. (3) $\frac{159}{3146}$. (4) $\frac{1}{22}$. (5) $4\frac{1}{6}$.
(6) $\frac{1}{2}$. (7) $\frac{1}{3}$. (8) $1\frac{513}{1225}$. (9) 1. (10) $7\frac{41}{60}$
(11) $3\frac{181}{330}$. (12) 4. (13) $\frac{5}{81}$. (14) $\frac{1}{8}$.

XIV. Value of Fractions—

(1) 15*s*. 9*d*. (2) 3*s*. $4\frac{1}{5}$*d*. (3) 1 qr. 7 lbs.
(4) 1 fur. 16 pls. $2\frac{10}{17}$ yds. (5) 1*s*. $5\frac{1}{3}$*d*.
(6) £3 12*s*. 6*d*. (7) £30 19*s*. $5\frac{13}{49}$*d*. (8) £2 9*s*. $10\frac{1}{2}$*d*.
(9) 78 yds. 1 qr. $2\frac{2}{5}$ nls. (10) 1A. 0R. 10 per.
(11) £20 18*s*. $6\frac{62}{63}$*d*. (12) 9*s*. $2\frac{4}{7}$*d*. (13) 25 cwt. 0 qr. $3\frac{23}{27}$ lbs.
(14) £2 1*s*. $6\frac{9}{40}$*d*. (15) $22\frac{2}{55}$ lbs. (16) 8 cwt. 1 qr. $17\frac{11}{36}$ lbs.
(17) £5. (18) 3R. 10P. (19) 6*s*. $3\frac{1}{4}$*d*.
(20) 1*s*. $0\frac{3}{4}$*d*. (21) 16*s*. $4\frac{1}{2}$*d*. (22) $4\frac{1}{4}$*d*.
(23) £2 17*s*. $9\frac{1}{3}$*d*.

XV. Reduction—

(1) $\frac{1}{2520}$. (2) $\frac{5}{7}$. (3) $\frac{3087}{3200}$. (4) $\frac{12}{25}$. (5) $1\frac{57}{64}$.
(6) $\frac{3}{121}$. (7) $\frac{1}{480}$. (8) $\frac{25}{36}$. (9) $\frac{3}{8}$. (10) $\frac{1}{39}$.
(11) $\frac{3}{33880}$. (12) $\frac{1}{20160}$. (13) $\frac{1}{1215}$ (14) $\frac{2}{315}$. (15) $\frac{53}{528}$.
(16) $\frac{1}{7}$. (17) 2. (18) $\frac{1}{512}$. (19) $\frac{421}{21120}$. (20) $\frac{1}{6}$.
(21) $\frac{9}{56}$. (22) $\frac{7}{8}$. (23) $\frac{4}{9}$. (24) $\frac{1}{72}$. (25) $\frac{10}{11}$.
(26) $\frac{8230}{42777}$. (27) $\frac{1715}{1851}$. (28) $\frac{5}{111}$.

XVI. Miscellaneous Questions and Proportion—

(1) $5\frac{1}{3}$. (2) $3\frac{87}{92}$. (3) 7*s*. $1\frac{1}{3}$*d*. (4) $\frac{7}{15}$. (5) $1\frac{6}{7}$.
(6) 1. (7) 288 subscribers and the amount is £213 12*s*.
(8) *A*'s daily wage £$\frac{1}{3}$ or 6*s*. 8*d*; *B*'s £$\frac{5}{12}$ or 8*s*. 4*d*.; *C*'s £$\frac{3}{7}$ or 8*s*. $6\frac{6}{7}$*d*.
(9) £$48\frac{32}{39}$ or £48 16*s*. $4\frac{12}{13}$*d*. (10) $24\frac{7}{16}$ miles.
(11) £500. (12) 4 days. (13) 171 tiles. (14) $\frac{7}{60}$.
(15) 12*s*. 6*d*. + 2*s*. 2*d*. + £303 4*s*. $3\frac{11}{34}$*d*. + £3 13*s*. 6*d*. = £307 12*s*. $5\frac{11}{34}$*d*.

DECIMAL FRACTIONS.

I. Vulgar Fractions expressed as Decimal Fractions—

(1) ·125. (2) ·007. (3) 3·75. (4) 67·001.
(5) 37·14. (6) 2·75. (7) $\cdot 00\dot{3}$. (8) 6·25.
(9) ·00016. (10) $\cdot 4\dot{3}\dot{9}$. (11) 36·57. (12) ·0007.
(13) ·003. (14) 10·7.

II. Decimal Fractions expressed as Vulgar Fractions—

(1) $\frac{1}{2}$. (2) $\frac{1}{20}$. (3) $\frac{7}{80}$. (4) $\frac{21}{80}$. (5) $3\frac{3}{40}$.
(6) $\frac{1}{1600}$. (7) $\frac{3}{2500}$. (8) $7\frac{1}{200}$. (9) $37\frac{1}{4000}$. (10) $\frac{1}{88}$.
(11) $\frac{1}{55}$. (12) $\frac{1}{44}$. (13) $\frac{53}{55}$. (14) $1\frac{1}{90}$. (15) $17\frac{11}{36}$.
(16) $\frac{1}{3}$. (17) $\frac{1}{9}$.

III. Addition—

(1) 518·3106. (2) 145·07127. (3) 35·877.
(4) 7620·584. (5) 5. (6) 4·578.
(7) 19·9$\dot{6}$. (8) 8·6$\dot{9}$55500$\dot{0}$. (9) ·300712.

IV. Subtraction—

(1) 48·511. (2) 123·42077. (3) 3·7483.
(4) 8·1502. (5) ·$\dot{2}$4$\dot{3}$. (6) ·1$\dot{4}$.
(7) ·0005. (8) 6·7995. (9) ·$\dot{3}\dot{0}$.
(10) 1270·16255. (11) ·229975. (12) 24·5326.

V. Multiplication—

(1) ·000080223. (2) ·0020304. (3) ·01653877.
(4) ·4206969. (5) ·00756. (6) ·0000128.
(7) ·251. (8) ·24448. (9) ·268975.
(10) 74·9265. (11) ·00749265. (12) ·0015.
(13) 2400·6. (14) ·0001. (15) ·01.
(16) ·1. (17) ·00001. (18) ·1.
(19) 1. (20) ·009182 +. (21) 4·29012 +.
(22) 40·$\dot{8}$.

VI. Division—

(1) ·00012. (2) 3000. (3) 3122. (4) ·02.
(5) 35. (6) 6·056. (7) 9·236. (8) 18472.
(9) 24600. (10) 6·59. (11) 6590. (12) ·603.
(13) 27030. (14) 3000. (15) ·003. (16) 3.
(17) 22500. (18) 545·6. (19) ·0096. (20) 9600.
(21) 1·7. (22) 1700. (23) 17. (24) ·00102.
(25) 5. (26) 13. (27) ·000412. (28) 6·006.
(29) 8·8. (30) 1·4$\dot{6}$. (31) 6·$\dot{0}$5$\dot{4}$. (32) 2·541$\dot{6}$.
(33) 41·4. (34) ·0270$\dot{4}$5. (35) 61·162984 cub. in.
(36) ·9941 +. (37) ·000004 inch.

VII. Value of Decimals—

(1) 13*s.* 6*d.* (2) £37 12*s.* 6*d.* (3) 15*s.* 7$\frac{1}{2}$*d.*
(4) 3*s.* 10$\frac{2}{3}$*d.* (5) £1 8*s.* 7$\frac{7}{11}$*d.* (6) 9$\frac{15}{16}$*d.*
(7) £9 7*s.* 9$\frac{3}{4}$*d.* (8) 2 miles 2 fur. 26$\frac{2}{3}$ poles.
(9) 2*s.* 3$\frac{1}{2}$*d.* (10) 3 qrs. 7 lbs. (11) 6*s.* 3*d.*
(12) £1 5*s.* 0$\frac{3}{4}$*d.* ·0012. (13) £5 6*s.* 9$\frac{1}{4}$*d.*
(14) £1 7*s.* 11$\frac{3}{4}$*d.* ·78496. (15) £16 0*s.* 7$\frac{1}{2}$*d.*
(16) 14*s.* 9*d.* (17) $\frac{1}{8}$*d.* (18) 17*s.* 6*d.*
(19) 16*s.* 4*d.*; 16*s.* 4$\frac{4}{11}$*d.*; 16*s.* 4$\frac{8}{25}$*d.*

VIII. Reduction—

(1) 4·6329 + . (2) 5·2886 + . (3) 5·3645 + .
(4) 9·5 (5) ·43. (6) ·008$\dot{3}$.
(7) 3·795. (8) ·625. (9) 1·325.
(10) 1·224. (11) ·1$\dot{6}$. (12) ·096.
(13) ·6805 + , (14) ·035. (15) ·14375.
(16) ·4$\dot{8}$. (17) ·32$\dot{7}$. (18) ·018125.

DUODECIMALS, AREAS, AND VOLUMES.

(1) 49 sq. ft. 4′ 6″ = 49 sq. ft. 54 sq. in.
(2) 89 sq. ft. 1′ 9″ 9‴ 3^{4} = 89 sq. ft. $21\frac{37}{48}$ sq. in.
(3) 174 sq. ft. 11′ 2″ 2‴ 6^{4} = 174 sq. ft. $134\frac{5}{24}$ sq. in.
(4) 960 sq. ft. 7′ 0″ 3‴ 9^{4} = 960 sq. ft. $84\frac{5}{16}$ sq. in.
(5) 1416 sq. ft. 5′ 10″ 10‴ 6^{4} = 1416 sq. ft. $70\frac{7}{8}$ sq. in.
(6) 74 sq. ft. 11′ 9″ 5‴ 6^{4} = 74 sq. ft. $141\frac{11}{24}$ sq. in.
(7) 11 sq. ft. 9 6″ 1‴ 6^{4} = 11 sq. ft. $114\frac{1}{8}$ sq. in.
(8) 8 sq. ft. 2′ 3″ 9‴ = 8 sq. ft. $27\frac{3}{4}$ sq. in.
(9) 37 sq. ft. 3′ 9″ 9‴ 8^{4} = 37 sq. ft. $45\frac{29}{36}$ sq. in.
(10) 479 cub. ft. 5′ 10″ = 479 cub. ft. 840 cub. in.
(11) 401 cub. ft. 2′ 1″ 0‴ 1^{4} = 401 cub. ft. $300\frac{1}{12}$ cub. in.
(12) 480 cub. ft. 10′ 2″ 3‴ = 480 cub. ft. 1467 cub. in.
(13) 316 cub. ft. 5′ 10″ 7‴ 11^{4} 2^{5} 8^{6} = 316 cub. ft. $847\frac{101}{108}$ cub. in.
(14) £23 0*s.* $4\frac{11}{36}$*d.* (15) £63 7*s.* $11\frac{35}{48}$*d.* (16) 759 tiles.
(17) 3229 cub. ft. 1044 cub. in. (18) £37 16*s.* $4\frac{1}{2}$*d.*
(19) Area = $231\frac{1}{9}$ sq. ft.; expense = £12 6*s.* $5\frac{1}{2}$*d.*
(20) £8 4*s.* $0\frac{3}{4}$*d.* (21) 97 yds. $2\frac{1}{3}$ ft. (22) $34\frac{3}{4}$ sq. ft.
(23) 64 cwt. 3 qrs. 4 lbs. 13 oz. (24) £8 18*s.* 9*d.*
(25) 54 yds. $2\frac{1}{16}$ ft.; £12 19*s.* $9\frac{3}{16}$*d.* (26) £6 6*s.*

SQUARE ROOT.

(1) 217. (2) 456. (3) 23970. (4) 7048.
(5) 150·1. (6) 16·067 + . (7) ·0056. (8) ·03162 + .
(9) ·001. (10) 3·316 + . (11) 6·930 + . (12) $\frac{3}{4}$.
(13) 2·0493 + . (14) $\frac{15}{19}$. (15) ·86602 + . (16) 1·6583 + .
(17) $4\frac{1}{4}$. (18) 908 yds. (19) 362 yds. (20) 126 yds.
(21) 8379 yds. (22) 396·8 + yds.

CUBE ROOT.

(1) 72. (2) 301. (3) 104·5 (4) ·965 + .
(5) ·02. (6) $\frac{5}{7}$. (7) 3·107 + . (8) 1·357 + .
(9) $1\frac{1}{2}$. (10) ·82207 + . (11) $3\frac{1}{2}$. (12) 1·9309 +
(13) 48 inches.

PROFIT AND LOSS.

(1) £8 18*s*. 9*d*. gain. (2) £6 6*s*. gain.
(3) £1 2*s*. $3\frac{3}{4}$*d*. gain. (4) £10 per cent.
(5) £$3\frac{1733}{1989}$ or £3 17*s*. $5\frac{73}{663}$*d*. gain per cent.
(6) £15 17*s*. 4*d*. per cwt. (7) 9*s*. $8\frac{1}{2}$*d*. per yard.
(8) £79 9*s*. $3\frac{3}{10}$*d*. selling price. (9) £673 1*s*. $6\frac{6}{13}$*d*. prime cost.
(10) £42 prime cost. (11) £2 4*s*. $11\frac{1}{3}$*d*. per cwt.
(12) £38. (13) £2 2*s*. $4\frac{8}{19}$*d* selling price.
(14) 17 cwt. 0 qr. 16 lbs. (15) £2 16*s*. 9*d*. each.
(16) £$12\frac{16}{357}$ or £12 0*s*. $10\frac{90}{119}$*d*. per cent.
(17) 14*s*. $8\frac{8}{17}$*d*. (18) 4*s*. 8*d*. per yd.
(19) £7 per cent. loss. (20) 17*s*. 6*d*. per gallon.

FELLOWSHIP.

(1) £9; £15; £21.

(2) £503 8*s*.; £587 6*s*.; £671 4*s*.

(3) £360; £144; £240.

(4) *A*'s share £212 2*s*.; *B*'s £353 10*s*.; *C*'s £388 17*s*.

(5) *A* ought to pay £2 13*s*. 4*d*.; *B* ought to pay £3 6*s*. 8*d*.; *C* ought to pay £4; so that *A* must give *B* afterwards 2*s*. 6*d*. and *C* must also give *B* 3*s*.

(6) £3333 6*s*. 8*d*. to the son; £833 6*s*. 8*d*. to each daughter.

(7) £1400 to eldest son; £840 to each younger son; £420 in charities.

(8) *A* will pay £7; *B* £1 10*s*.; *C* £3 10*s*.

(9) *A* pays £4 10*s*. $9\frac{351}{841}$*d*.; *B* £5 9*s*. $2\frac{290}{841}$*d*.

(10) *A* £1228; *B* £1542.

(11) *A* will receive £148 2*s*. $11\frac{5}{9}$*d*.; *B* £101 17*s*. $0\frac{4}{9}$*d*.

(12) *A*'s share £350; *B*'s £450.

(13) 4*s*. $9\frac{3}{5}$*d*. in the pound; £252.

STOCKS.

(1) £1920. (2) £2240. (3) £800.
(4) £3741. (5) £504. (6) £707 4*s.* 10$\frac{1}{5}$*d.*
(7) £4643 15*s.* (8) £28. (9) £71 2*s.* 2$\frac{2}{3}$*d.*
(10) £180. (11) £3642 17*s.* 1$\frac{5}{7}$*d.* (12) £1725.
(13) £4$\frac{2}{17}$. (14) £4$\frac{4}{5}$. (15) £4$\frac{6}{11}$.
(16) £1350 and £3$\frac{1}{3}$. (17) £5 16*s.* 11$\frac{1}{2}$*d.* + £5 8*s.* 7$\frac{1}{4}$*d.* = £11 5*s.* 6$\frac{3}{4}$*d*
(18) 3$\frac{1}{4}$ at 92$\frac{5}{8}$, the better investment.
(19) £140 income—£98$\frac{2}{15}$ price of the 4 per cents.
(20) £818 8*s.* (21) £24 difference in income.
(22) £49 income. (23) £1738$\frac{1}{33}$. (24) £3000 present val. (25) 80.
(26) £31 2*s.* 6$\frac{210}{257}$*d.* at the first price; £31 0*s.* 11$\frac{377}{773}$*d.* at the latter price.

MISCELLANEOUS QUESTIONS ON ALL THE RULES.

(1) 34 qrs. 3 bus. 2 pks. (2) 31 qrs. 2 bus. (3) £1 0*s.* 8$\frac{152}{187}$*d.*
(4) 24 men. (5) £3396 0*s.* 5*d.* (6) £72 5*s.* 4$\frac{6}{7}$*d.*
(7) £39478 1*s.* 6*d.* (8) £130. (9) 4 yrs.
(10) £1 5*s.* 4*d.* per gallon. (11) 4*d.* loss. (12) 30 oranges.
(13) 9*s.* 4$\frac{1}{2}$*d.* loss in English money. (14) £2376 5*s.*
(15) £2577 12*s.* 1*d.* (16) 1*s.* 10$\frac{6}{7}$*d.*:—2*s.* 1*d.* (17) 1.
(18) 11$\frac{3}{11}$*d.* value of a shilling if all pure silver.
(19) £128 8*s.* 11$\frac{9}{13}$ (20) 2*s.* 6*d.* value per hour.
(21) £412 costs. (22) 2 days. (23) $\frac{3}{128}$:—·0234375.
(24) £3 10*s.* (25) 8 books more. (26) $\frac{1}{880}$; ·0011$\dot{3}\dot{6}$.
(27) 864 planks:—cost £233 17*s.* 9*d.* (28) 21 days.
(29) Simple interest £14 5*s.* 7$\frac{1}{5}$*d.*:—compound interest £14 17*s.* 2$\frac{362}{3125}$*d.*
(30) 144 in all. (31) 5$\frac{3}{5}$ or 5·6. (32) £11 5*s.*
(33) $\frac{47}{80}$. (34) £275. (35) 6$\frac{82}{1013}$; 4$\frac{151}{216}$.
(36) 2*s.* 2$\frac{1}{2}$*d.* per lb. (37) 250000 sq. links. (38) £98 8*s.* 9$\frac{18}{125}$*d.*
(39) $\frac{1}{3}$ quart. (40) 16 hours. (41) £78 income.
(42) 615$\frac{3}{5}$ or 615·6. (43) 2$\frac{11}{18}$. (44) £40 16*s.* 8*d.*
(45) 1$\frac{1}{15}$. (46) £29 3*s.* 4*d.* (47) 352 times. (48) 1$\frac{1}{80}$.
(49) 1*s.* 7$\frac{11}{18}$*d.* per lb. (50) 2$\frac{17}{50}$ lbs. copper;—$\frac{33}{50}$lb. zinc. (51) £160.
(52) Interest, £53 10*s.*; true discount £50 19*s.* 0$\frac{4}{7}$*d.*; difference £2 10*s.* 11$\frac{3}{7}$*d.*

(53) 30000 bricks. (54) £1. (55) £44 13*s*. $4\frac{8}{11}d$.
(56) 275 yards long. (57) 28·68 + ft. long. (58) £3 14*s*. 3*d*.
(59) £56 :—£61. (60) 2*s*. $4\frac{19}{50}d$. selling price per lb.
(61) 23 cwt. 1 qr. $0\frac{1}{3}$ lb. (62) $37\frac{5}{9}$ sq. yds. of carpet. (63) 12 ft. high.
(64) $28\frac{1}{2}$ planks :—3 cwt. 3 qrs. $7\frac{1}{2}$ lbs. (65) ·078112. (66) ·0081.
(67) £5 1*s*. 8*d*. entire loss :—£5 loss per cent.
(68) The eldest surviving son will have $(\frac{1}{2}+\frac{1}{9})$ or $\frac{11}{18}$ of his father's estate after the death of the second son; the youngest son will have $(\frac{1}{6}+\frac{2}{9})$ or $\frac{7}{18}$ of his father's estate.
(69) After 5 revolutions of 1st wheel, 3 of 2nd, 2 of 3rd; or after five seconds.
(70) 8 times each minute. (71) 1.
(72) £15 loss; £45 gain in income by investing in the $4\frac{1}{2}$ per cents. at 102.
(73) $1\frac{313}{462}$ (74) $1\cdot05\dot{7}$. (75) 10 hrs. 50 min.
(76) £223 13*s*. 4*d*. – £220 = £3 13*s*. 4*d*. difference.
(77) The Yarmouth journey the more expensive by $\frac{431}{1560}d$. per mile.
(78) $\cdot453\dot{2}17\dot{8}$. (79) $31097\cdot\dot{6}1904\dot{7}$. (80) 1*s*. 6*d*.
(81) $109\frac{1}{4}$ yds. = £6 7*s*. $5\frac{1}{2}d$. (82) £2 18*s*. $9\frac{15}{17}d$. loss.
(83) £107 14*s*. 2*d*. (84) 1·25. (85) ·0075416. (86) $\frac{37}{84}$.
(87) £6 5*s*. $2\frac{1}{4}d$. (88) £400. (89) $21\frac{3}{7}$ days. (90) $\cdot00\dot{2}\dot{4}$.
(91) 2*s*. $3\frac{45}{59}d$. (92) £3 (93) £1 (94) 12 ft. high.
(95) $67\frac{7}{8}$. (96) 11*s*. 8*d*. per gallon. (97) £400.
(98) 10*s*. (99) 4 per cent. (100) £56; £25; £20; £64.
(101) The 4 per cents. the better investment. Value of stock is £13,704 16*s*. $4\frac{52}{55}d$.
(102) 57 years. (103) 660 men. (104) 258 eggs.
(105) *A* = £5 17*s*. $6\frac{1}{4}d$.; *B* = £11 15*s*. $0\frac{1}{2}d$.; *C* = £17 12*s*. $6\frac{3}{4}d$.
(106) $6\frac{2}{5}d$. per gallon. (107) £17 17*s*. $1\frac{5}{7}d$. (108) $\frac{1}{47}$.
(109) 45816·11479. (110) 11*s*. $1\frac{1}{2}d$.; ·11125.
(111) 597·2607. (112) £4166 13*s*. 4*d*.
(113) Interest = £25; true discount = £20; difference = £5.
(114) £787 8*s*. $0\frac{48}{127}d$. (115) 300 boys.
(116) The candles $8\frac{1}{2}$ in. long are the cheaper; gain per cent. = £$1\frac{131}{306}$.
(117) 501000; ·00501. (118) 10*s*.
(119) 2047 cub. ft. 1572 cub. in.
(120) £5 loss. (121) £27. (122) Half full.
(123) Interest on £450 = £10 10*s*.; true discount on £460 10*s*. = £10 10*s*.
(124) At 15 minutes 3 seconds past 1 o'clock P.M.
(125) $12\frac{1}{2}$ days. (126) 4000 sq. mètres.
(127) Simple int. = £450, comp. int. = £484 11*s*. $10\frac{1}{2}d$.
(128) A = $1\frac{1}{3}$; B = $1\frac{4}{9}$; C = $\frac{4}{5}$. (129) £130.
(130) $3\frac{29}{30}$, $1\frac{13}{30}$. (131) £4011 6*s*. $6\frac{1}{4}d$.

(132) ·82008 ; ·002 ; 200; 2; 20000. (133) 2 fur. $14\frac{124}{375}$ poles.
(134) 41 cwt. 2 qrs. $14\frac{4932}{5975}$ lbs. (135) $15\frac{5}{8}$ carats.
(136) £14520. (137) 3·60555 + ; 2 sq. yds. 8 sq. ft. 6 sq. in.
(138) £2 15*s.* $6\frac{2}{3}$*d.*; £5 11*s.* $1\frac{1}{3}$*d.*; £8 6*s.* 8*d.* (139) ·27.
(140) £720. (141) 4 per cent. (142) £1350; £9.
(143) £104 3*s.* 4*d.* (144) 19 navvies. (145) $\frac{7}{32}$ gallon.
(146) £22 5*s.* $2\frac{2}{5}$*d.* (147) 1. (148) £454 10*s.*
(149) 30 hours. (150) £14. (151) £40; £60; £63.
(152) 8*s.* 6*d.* (153) £900. (154) $5\frac{15}{17}$. (155) £2625.
(156) £1000 stock. (157) 14*s.* 2*d.* (158) 6 cwt. 3 qrs. 14 lbs.
(159) 820·6. (160) £100 less. (161) 15 men.
(162) $7\frac{10}{11}$. (163) £22080. (164) $8\frac{3}{4}$*d.* per gallon.
(165) 562·1. (166) $18\frac{1}{2}$; ·0075. (167) 18.
(168) £4 10*s.* (169) $5\frac{41}{59}$ days. (170) $1\frac{11}{16}$ or 1·6875.
(171) £4 per cent. (172) 8 years of age. (173) 45 days.
(174) £37 13*s.* 4*d.*; £$9\frac{5}{12}$. (175) ·03. (176) 100 lbs.
(177) $2\frac{8}{21}$. (178) 14 yds. (179) Boy = 1*s.* 4*d.*; man = 2*s.* 8*d.*
(180) 30 days. (181) 1·344. (182) £7300. (183) 8*d.* per lb.
(184) £11 13*s.* 4*d.*; $41\frac{2}{3}$ per cent. (185) $4\frac{1}{8}$. (186) £11 1*s.* 8*d.*
(187) £1 12*s.* $4\frac{4}{5}$*d.* per gallon. (188) £250. (189) 680 yds.
(190) £960. (191) $2\frac{58}{181}$. (192) 107·3125. (193) 10 men.
(194) £400. (195) $4\frac{4}{15}$ hours. (196) $9\frac{1}{11}$ days.
(197) 33 yds. 0 ft. 9 in. (198) $\frac{1125}{5117}$.
(199) 12*s.* (200) £27 14*s.* 7*d.*
(201) £4 15*s.* 2*d.* (202) B.P. = 12*s.* 6*d.*; S.P. = 12*s.*
(203) 15 men. (204) £7215 7*s.* $9\frac{75467}{91881}$*d.*
(205) Tea = 3*s.* 9*d.* per lb.; coffee = 1*s.* 3*d.* per lb. (206) 480 lbs.
(207) £873 4*s.* (208) £3 17*s.* (209) 18 minutes past 9 o'clock A.M.
(210) $5\frac{5}{9}$ gallons of water. (211) 28*s.* per gallon.
(212) A = £838; B = £167 12*s.* (213) $28\frac{9}{40}$; 2.
(214) ·00001; 1; 10; ·0001. (215) £2072 7*s.* 9*d.*
(216) 32 days. (217) £7 4*s.* $11\frac{2}{5}$*d.*
(218) Area = 810 sq. ft. 60 sq. in.; expense = £1 1*s.* $1\frac{49}{192}$*d.*
(219) £16 11*s.* $11\frac{51}{128}$*d.* (220) 90. (221) 88 per cent.
(222) 569. (223) 186 lbs. 14 oz.
(224) $4\frac{3}{8}$; 4·8. (225) 1016; 101; 3·5615.
(226) £461 13*s.* $5\frac{1}{4}$*d.* (227) £60 0*s.* 6*d.*; $\frac{5}{7}$ cwt.
(228) £48 17*s.* $8\frac{1}{2}$*d.* (229) 8 hours per day.
(230) 20 minutes after 5 P.M. on Tuesday; 9 P.M. on Tuesday.
(231) £2 12*s.* (232) £127 10*s.*
(233) 979; 342240. (234) 3·103; 4·90; 8·316. (235) £130.
(236) Man = £15 15*s.*; woman = £13 15*s.*

(237) S.I. = £1 16*s*.; T.D. = £1 15*s*. $9\frac{57}{67}$*d*.; diff. = $2\frac{10}{67}$*d*.
(238) 25 years. (239) 49 lbs. of coffee, and 21 lbs. of chicory.
(240) $\frac{39}{230}$. (241) 8 gallons.
(242) A in $18\frac{2}{3}$ days; B in $33\frac{3}{5}$ days; and C in 24 days.
(243) 6*s*. 8*d*. (244) £2 16*s*. (245) £9600; 90
(246) 26 yds. 2 ft. (247) 363. (248) $7\frac{7}{12}$.
(249) $12\frac{7}{72}$. (250) ·83; 83; 830000.
(251) £875. (252) 1*s*. 10*d*. (253) 30·98.
(254) A = £320; B = £150; C = £530. (255) 1019.
(256) 120. (257) £2666 13*s*. 4*d*. (258) $329\frac{3}{8}$ gallons.
(259) G.C.M.'s = $\frac{1}{60}$, $\frac{1}{120}$; L.C.M.'s = 60, 19600.
(260) 40 additional men. (261) 2 lbs. at 2*s*. 6*d*.; 1 lb. at 3*s*.
(262) $\cdot408\dot{3}$. (263) $83\frac{4}{7}$. (264) £17 2*s*. $0\frac{216}{421}$*d*.
(265) 11 cwt. 3 qrs. 19 lbs. (266) 3 per cent. (267) £900; £940.
(268) 3*d*. (269) £6 12*s*. 9*d*. (270) 120·84; ·02475. (271) $8\frac{29}{72}$.
(272) 53·56. (273) A = £200; B = £400; C = £800; D = £350.
(274) $22\frac{1}{2}$ minutes. (275) £199 1*s*. 3*d*.
(276) 10*s*. gained by latter plan. (277) 65.
(278) 270. (279) $\frac{2}{7}$ths saved. (280) 292 yds. $1\frac{109}{110}$ ft.
(281) $88\frac{1}{2}$. (282) ·0000017; 1700000; 2250; 276·7875. (283) $7\frac{7}{8}$ days.
(284) 30 gallons. (285) £750. (286) $\frac{13}{36}$.
(287) £66. (288) £62 19*s*. $4\frac{1}{2}$*d*. (289) 15*s*. per yd.
(290) £11 6*s*. (291) 18 gallons (292) 21 days. (293) 90.
(294) $1\frac{25}{33}$. (295) £305. (296) 2. (297) 78 qrs. 3 bush.
(298) £926 10*s*. (299) £600. (300) ·00001728. (301) 13·5.
(302) 489. (303) 13*s*. 9*d*. (304) 4 per cent.
(305) Man = £6; woman = £4; boy = £2 13*s*. 4*d*. (306) 7600 bad eggs.
(307) 19·794375. (308) $74\frac{4}{5}$. (309) £236 13*s*. $2\frac{7}{11}$*d*
(310) A = £80; B = £20; C = £25. (311) 3 women.
(312) $\frac{5}{8}$. (313) £640. (314) 16*s*. 3*d*. (315) $7\frac{17}{49}$.
(316) $44\frac{3}{13}$ per cent. (317) £1100; 4 per cent.
(318) £4 3*s* $0\frac{4}{9}$*d*. (319) 11. (320) $\frac{13}{23}$.
(321) £278 10*s*. (322) 10. (323) $17\frac{13}{66}$. (324) 4·5.
(325) ·483; 2·1. (326) 174.
(327) 72 lbs. at 4*d*, 24 lbs. at 3*d*, 24 lbs. at $2\frac{1}{2}$*d*.
(328) 10 per cent. (329) $9\frac{11}{20}$. (330) 50 ft. 3 in. (331) $2\frac{29}{57}$.
(332) 160 lbs. (333) $\frac{1}{3}$. (334) 10 lbs. (335) $10\frac{27}{40}$.
(336) 214. (337) 17361. (338) 2 cwt. 3 qrs. $1\frac{1}{2}$ lbs.
(339) £106 17*s*. 6*d*. (340) 10 cwt.
(341) $1\frac{13}{30}$; $\frac{1}{5}$. (342) ·06; 640000. (343) $\frac{39}{40}$.
(344) £29 3*s*. 11*d*. (345) 121. (346) 4 cwt. 1 qr. 24 lbs.
(347) S.I. = £662 4*s* $11\frac{11}{50}$*d*; C.I. = £50 12*s*. 6*d*. (348) 12·03.

(349) —— (350) 1. (351) ·009375; 2440; ·00244.
(352) 14*s*. $5\frac{1}{3}$*d*.; ·14. (353) £683 5*s*. $11\frac{5}{26}$*d*.
(354) 20·057 oz. (355) 1039; ·3285+; 8·3588+.
(356) £962 19*s*. $10\frac{254}{287}$*d*. (357) $4\frac{1}{6}$ per cent.
(358) By former plan £56 5*s*., and by latter plan £58 1*s*.
(359) £1600. (360) $\frac{34}{41}$. (361) ·006. (362) 60 days.
(363) $43\frac{7}{11}$ minutes after 8 o'clock. (364) £91 10*s*.
(365) $9\frac{1}{4}$ per cent. (366) 90 lbs. (367) £2500.
(368) £3450. (369) 3 miles. (370) ·0904761.
(371) 2 feet. (372) 4500 books. (373) 4 galls. of water.
(374) £108. (375) 137·65 and $1\frac{9}{14}$. (376) 3 cwts. $10\frac{6}{25}$ lbs.
(377) 13·38+inches. (378) $\frac{410}{4921}$. (379) 24 ft. and 12 ft.
(380) £13200. (381) 1*s*. 4*d*. (382) $\frac{11}{1200}$. (383) 46*s*.
(384) 93 ft. and 31 ft. (385) 6 extra men. (386) 50·802+.
(387) £53 1*s*. $4\frac{32}{73}$*d*. (388) $17\frac{1}{2}$. (389) $297\frac{3}{5}$ gallons.
(390) A=£1 12*s*. $5\frac{7}{37}$*d*.; B=17*s*. $6\frac{30}{37}$*d*.
(391) 304·4+inches; 9115 cwts. 2 qrs. $1\frac{1}{2}$ lb.
(392) ·485 or $\frac{97}{200}$. (393) £225. (394) £1 13*s*. 9*d*.
(395) $\frac{1}{6}$ water. (396) £3 17*s*. (397) ·253.
(398) £7 16*s*. $6\frac{6}{23}$*d*. (399) £225; £300; £375.
(400) 60, 90, 120. (401) 18 yds. (402) 93.
(403) 56·25. (404) £60. (405) 288. (406) 60 ft.
(407) $1\frac{9}{35}$. (408) ·000013, ·001, 13. (409) $4901\frac{19}{25}$.
(410) £10000. (411) 125 acres. (412) £7917.
(413) $16\frac{4}{31}$. (414) 100 books. (415) 12*d*. per lb.
(416) £720, £800, £450. (417) $21\frac{9}{11}$ minutes after 10.
(418) $15\frac{34}{75}$ or 15·453. (419) $1\frac{23}{48}$. (420) 5 per cent.
(421) 6 days. (422) £2750. (423) £2 0*s*. $8\frac{1}{2}$*d*.; $\frac{977}{1134}$.
(424) £33 15*s*. (425) $15\frac{20}{27}$. (426) 22080.
(427) 16, 28, 36. (428) $2\frac{309}{1600}$. (429) 658209·6+mètres.
(430) £2 10*s*. (431) ·0578.
(432) £3 17*s*. $9\frac{1}{2}$*d*.; $1\frac{355}{1512}$. (433) £6 19*s*. 4*d*.
(434) £1485 2*s*. $11\frac{65}{101}$*d*.+£1176 9*s*. $4\frac{16}{17}$*d*.+£1456 6*s*. $2\frac{58}{103}$*d*.
=£4117 18*s*. $7\frac{26147}{176851}$*d*.
(435) £19 12*s*. (436) £8500, £10500, £19000.
(437) $28\frac{4}{7}$ per cent. (438) 1000 men. (439) £1 18*s*. 6*d*.
(440) $11\frac{13}{22}$. (441) $1\frac{13}{20}$. (442) £6 3*s*. 11*d*.
(443) 24 men. (444) Value=£413; com.=£10 6*s*. 6*d*.
(445) 16; ·0016; ·000016. (446) £1250.
(447) 2 feet. (448) £16140 7*s*. $0\frac{12}{57}$*d*.
(449) £2000 Stock. (450) 1600 men. (451) $\frac{84}{169}$.
(452) £4 7*s*. $10\frac{1}{2}$*d*.; 1·0984375. (453) $1\frac{3}{50}$.
(454) £2500; £800. (455) ·01. (456) £5 12*s*.

(457) 10*s.* (458) £12000. (459) £2800.
(460) £350 lost by this plan. (461) 40. (462) $7\frac{13}{77}$ hours.
(463) $\frac{969}{1040}$. (464) £1 8*s.* $6\frac{1}{2}$*d.* (465) 10 hours.
(466) ·125. (467) 8 boys. (468) 24 ft. 18 ft. 12 ft.
(469) 5 per cent. (470) $\cdot 4\dot{3}\dot{2}$. (471) $6\frac{1}{4}$ per cent.
(472) £6000. (473) £3200. (474) $12\frac{1}{3}$ per cent.
(475) £$\frac{670}{1729}$ per cent. (476) $1\frac{1}{11}$. (477) 1·7575.
(478) £2 2*s.* (479) $3\frac{9}{22}$ lbs. (480) $4\frac{4}{5}$ per cent.
(481) 2 ft. 6 in. (482) 7 years; £700. (483) £90.
(484) £585; £74 15*s.* (485) $72\frac{1}{2}$.
(486) 62 yds. and 248 yds. (487) $\frac{18}{25}$. (488) $89866\cdot\dot{6}$.
(489) 36 days. (490) 5 ft. 6 in. (491) £14 14*s.*
(492) $7\frac{3}{4}$ years. (493) $17\frac{1}{2}$ minutes. (494) $14\frac{347}{477}$ gain per cent.
(495) $\frac{35}{306}$. (496) 185 yds. (497) $22\frac{2}{9}$ minutes.
(498) $\frac{53}{64}$ done or $\frac{11}{64}$ to be done. (499) £357, £340, £272.
(500) 66·011 + inches. (501) 4·718277.
(502) $27\frac{1}{2}$ hours. (503) 12*s.* 6*d.* per gallon.
(504) 3·29 + ft. (505) 190 miles. (506) £57 15*s.* loss.
(507) £808, £606, £404. (508) Gas shares better by £$1\frac{419}{475}$ per cent.
(509) 1 lb. of inferior to 2 lbs. of better. (510) 2·999982.
(511) $4687\frac{1}{2}$ ft. (512) £$3\frac{21}{23}$ per cent. (513) $\cdot 426041\dot{6}$.
(514) 12 ft. high. (515) 4 and $4\frac{1}{2}$.
(516) 13 of brandy to 5 of water. (517) 1000 sheep.
(518) £96. (519) £3200. (520) £2 13*s.* $11\frac{1}{2}$*d.*
(521) 2 men. (522) £369 12*s.* $5\frac{113}{368}$*d.* (523) £21 5*s.*
(524) 4 gallons of better quality, 4 of inferior, and 3 of water.
(525) 60 fowls.
(526) 1 oz. of 18 carats fineness, 2 oz. of 15 carats, and 8 oz. of alloy.
(527) £2000; £525. (528) 14973500 half-crowns. (529) $7402\frac{67}{77}$.
(530) 10 tons 5 cwts.; 1 ton 2 qrs. (531) £1209.
(532) $\frac{4}{7}$, 2, $3\frac{27}{40}$. (533) A must pay B 7*s.* 1*d.*
(534) 1·5, 15000, 15. (535) ·2398 –
(536) £126 13*s.* 7*d.* (537) £12 18*s.* 9*d.* (538) 5 months.
(539) £1 5*s.* $3\frac{3}{4}$*d.* (540) 1460 poles.
(541) 45808416423. (542) £723 5*s.* $4\frac{1}{2}$*d.*
(543) 12 miles. (544) $2\frac{24}{317}$. (545) 36250.
(546) 17*s.* $6\frac{1}{2}$*d.*; $\cdot 017541\dot{6}$. (547) 25 per cent. gain.
(548) 2·200 + lbs. (549) £650. (550) £646 10*s.* $4\frac{1}{2}$*d.*
(551) Path = £55 12*s.* $3\frac{9}{25}$*d.*; Turfing = £121 5*s.* 6*d.*;
Total = £176 17*s.* $9\frac{9}{25}$*d.* (552) £$2691\frac{9}{58}$.
(553) 35715875. (554) 7*s.* 9*d.*
(555) $1\frac{17}{88}$; $8\frac{16}{21}$. (556) £3 17*s.* $6\frac{3}{4}$*d.*; ·034375.
(557) 29167; 13739; 3686; 3408. (558) £39 2*s.* $2\frac{2}{3}$*d.*

559) £50 10*s*. (560) $2\frac{142}{175}$ lbs. avoir. or 2 lbs. 12 oz. $15\frac{127}{175}$ drs.

(561) £622 16*s*. (562) 10500; 13·756.

(563) 24 miles per hour. (564) £88 11*s*.

(565) The 5 per cents. at $102\frac{3}{4}$ the better investment.
£48 13*s*. $2\frac{114}{137}$*d*. – £46 13*s*. $10\frac{58}{257}$*d*. = £1 19*s*. $4\frac{21352}{35209}$*d*. diff.

(566) £95 + £22 15*s*. = £117 15*s*. (567) 456654.

(568) 11. (569) £19 19*s*. $3\frac{1}{2}$*d*.

(570) $\frac{7}{8}$, $\frac{11}{12}$; 1. (571) $3\frac{7}{108}$; 83·3.

(572) ·05. (573) 25 per cent.

(574) £20. (575) He loses 25 francs or £1.

(576) £9 13*s*. $8\frac{20}{41}$*d*. (577) £2 10*s*.

(578) £174735. (579) 36218880.

(580) 743681 oz.; 796110 hf.-crs.

(581) £481 13*s*. $0\frac{1}{4}$*d*.; £13 16*s*. $10\frac{1}{2}$*d*.

582) £11 11*s*. $6\frac{3}{4}$*d*. (583) $7\frac{1}{4}$*d*. in the £.

(584) £1 1*s*. per day. (585) $3\frac{16}{113}$; $\frac{64}{85}$; $\frac{53}{122}$.

(586) 14 seconds. (587) ·63; $22{\cdot}3\dot{1}4623\dot{7}$.

(588) £5 5*s*. (589) $3\frac{1}{3}$; £614 2*s*. 6*d*.

(590) $3\frac{3}{4}$*d*. per oz. (591) 24·01.

(592) 1198954. (593) £2103 14*s*. 1*d*.

(594) 1. (595) 24855 mls. 522 yds. 0 ft. 8 in.

(596) $\frac{3}{160}$. $\frac{1}{4}$, $\frac{1}{8}$. (597) $\frac{1}{16}$ or ·0625.

(598) 3·25; 3250; 750.

(599) 28514. (600) 20 ac. 3 rds. 32 po. 2 sq. yds.

(601) £745 0*s*. 5*d*. (602) $6\frac{2119}{5376}$ centimes.

(603) $3\frac{3}{4}$ days. (604) $33\frac{1}{3}$ per cent.

(605) $2\frac{13}{31}$ per cent.

(606) 501000550050; 130130. (607) £77 7*s*. $7\frac{3}{4}$*d*.

(608) 16. (609) 3936. (610) £109 14*s*. $9\frac{1}{2}$*d*.

(611) £40 4*s*. 2*d*. (612) 16 shil.; $\frac{1}{1008}$. (613) $211\frac{7}{10}$ days.

(614) $56\frac{1}{4}$ miles. (615) $\frac{11}{12}$; 2 yds. 1 ft. 7 in.

(616) ·008; $\cdot\dot{0}94\dot{6}$. (617) 21 wks. (618) £1 5*s*.

(619) 111; 3360. (620) 1. (621) 5000; $5{\cdot}\dot{8}\dot{1}$.

(622) 160 yds.; £3. (623) 3443; $1\frac{1}{3}$.

(624) 4 per cent. (625) £7 10*s*. (626) £3600; £126.

(627) 99877. (628) 2053690. (629) 12345.

(630) £333 3*s*. $3\frac{1}{2}$*d*. (631) 366388. (632) 45 wks.

(633) £24 10*s*. $5\frac{1}{2}$*d*. (634) $\frac{3}{7040}$. (635) £666.

(636) 1; 1. (637) £5 10*s*. 10*d*. (638) 11000; ·0011; ·095.

(639) £9 5*s*. $10\frac{4}{5}$*d*. (640) 7; 6930.

(641) $\cdot 00\dot{7}$; 3000; ·0034. (642) £77 14*s*. $7\frac{5}{16}$*d*.

(643) £2 8*s*. $6\frac{68}{105}$*d*. (644) 6 days. (645) 2922; 1·73205 +
(646) £2 1*s*. 8*d*. (647) £258 13*s*. 6*d*.
(648) 1287034316; 278976302. (649) $9052\frac{50}{63}$.
(650) £1642 18*s*. $6\frac{1}{8}$*d*. (651) $\frac{1}{3}$; $4\frac{107}{216}$.
(652) 2 tons 4 cwts. 1 qr.; $\frac{177}{800}$. (653) 6·1722; ·0000265625; 1240.
(654) £1200. (655) £1 15*s*. 8*d*.; ·178$\dot{3}$.
(656) £124 11*s*. $6\frac{9}{80}$*d*. (657) $\frac{25}{96}$ per cent.; gains 4*s*. $8\frac{1}{4}$*d*. by this plan.
(658) 3 min. 45 sec.; 10 miles per hour. (659) $31\frac{9}{11}$ gain per cent.
(660) £153 5*s*. 10*d*. increase of income. (661) £3 7*s*. 9*d*.
(662) £187. (663) £301 6*s*. $1\frac{3}{4}$*d*. (664) 2.
(665) 2·715; 15·3; 1530000. (666) £7 18*s*. 4*d*.; $\frac{5}{6}$.
(667) £1071 4*s*. 6*d*.; £1000.
(668) 51 lbs. 7 oz. 4 dwts. 5 grs. + 87 lbs. 9 oz. 5 dwts. 3 grs.
= 139 lbs. 4 oz. 9 dwts. 8 grs.
(669) 2·471 + acres. (670) $4\frac{8}{9}$ yds.; $4\frac{7}{12}$ yds.
(671) £458 6*s*. 8*d*.; $3\frac{59}{72}$; £141 13*s*. 4*d*. (672) £24000.
(673) 20202030100; 86. (674) $\frac{5}{18}$; 7.
(675) 19*s*. $6\frac{1}{2}$*d*.; $\frac{63}{352}$. (676) 87·6 oz. (677) $\frac{22565}{34598}$; £1 3*s*. $8\frac{1}{2}$*d*.
(678) 27 cwt. 2 qr. $3\frac{103}{109}$ lbs. (679) £58·94$\dot{7}\dot{2}$ = £58 18*s*. $11\frac{19}{55}$*d*.
(680) $7\frac{11}{27}$ years. (681) 98. (682) 8*s*. 4*d*.
(683) ——; 9090909. (684) £13 12*s*. $11\frac{3}{4}$*d*. (685) £12 12*s*. 7*d*.
(686) 4 tons 18 cwt. 0 qr. 19 lbs. (687) 1; $\frac{5}{6}$.
(688) ·048; ·458$\dot{3}$; $\frac{5}{32}$; $\frac{1}{375}$. (689) 140; 3·5; ·0007.
(690) £560. (691) 6. (692) 9 days.
(693) 7 times. (694) £60 increase. (695) 1.
(696) L.C.M. = 459000 G.C.M. = 2376. (697) 13 times.
(698) 605000; 3906·25. (699) 999; $5\frac{4}{19}$. (700) £1078 16*s*.
(701) 21 days. (702) £90 13*s*. 4*d*. (703) 9090909.
(704) 64; 8757.
(705) £310 13*s*. $6\frac{1}{4}$*d*.; 1 ml. 3 fur. 10 po. 5 yds. 0 ft. 6 in.
(706) £18 3*s*. (707) G.C.M. = 23; L.C.M. = 609840.
(708) $\frac{47}{48}$; 1. (709) ·0002; 5000; ·125.
(710) 2*s*. $7\frac{1}{2}$*d*.; $\frac{13}{396}$. (711) $13\frac{1}{2}$ inches. (712) $10\frac{1}{2}$.
(713) A = £2 19*s*. 7*d*.; B = £11 18*s*. 4*d*.; C = £10 14*s*. 6*d*.
(714) 1 shilling per sq. yd. (715) £49595 16*s*. 8*d*.
(716) £1810 13*s*. 6*d*. (717) $\frac{5}{9}$; $\frac{13}{48}$; ·2847$\dot{2}$. (718) $\frac{11}{17}$.
(719) 2·115 +. (720) $\frac{8}{135}$. (721) £4 0*s*. 9*d*.
(722) 83 ft. 5 in. (723) 20 per cent. increase.
(724) £1500. (725) £780; 13*s*. in the £.
(726) 10 per cent. (727) 30004090109; 97. (728) 40.
(729) The latter by 8 miles 7 fur. 20 po. (730) $\frac{7}{9}$; $\frac{11}{12}$; $\frac{5}{36}$; ·0038$\dot{3}$
(731) 73·951 + oz. (732) ·001$\dot{6}$. (733) The latter by $3\frac{39}{80}$*d*

(734) 1. (735) 22 days. (736) 2$\frac{2}{5}$ per cent.

(737) 10 per cent. (738) £520. (739) 9 inches; 9 times

(740) 187. (741) 37; £2 18*s.* 5$\frac{1}{4}$*d.*; $\frac{11}{16}$.

(742) 4·938353; 8510. (743) $\frac{104}{185}$; ·5621. (744) £1085 6*s.* 0$\frac{1}{2}$*d.*

(745) 15. (746) £29 15*s.*; £7870.

(747) £762 11*s.*; the latter. (748) 12*s.* 6*d.*

(749) 15 sov.; 16 hf.-crs.; 75 shillings.

(750) 13006$\frac{1}{4}$ oz. or 7 cwt. 1 qr. 0 lb. 14$\frac{1}{4}$ oz. (751) 609.

(752) £5759. (753) 55 yds.

(754) 1 ac. 10 po. 4 sq. yds. 2 sq. ft. (755) £7; 4$\frac{1}{4}$*d.*; 1*s.* 10$\frac{1}{2}$*d.*

(756) 9 men. (757) £1 0*s.* 1$\frac{1}{2}$*d.* (758) 12; 24$\frac{16}{21}$.

(759) ·4; ·04; 40; ·125; 3 oz. 8 drs. (760) £20 2*s.* 6*d.*

(761) £82 8*s.* 8*d.* (762) £120; £40; £20.

(763) Comp. int. = £391 13*s.* 7$\frac{1}{5}$*d.*; amount = £5191 13*s.* 7$\frac{1}{5}$*d.*

(764) 1. (765) 5*s.* 6*d.*; $\frac{11}{42}$. (766) L.C.M. = 71280; G.C.M. = 19.

(767) £10 3*s.* 5$\frac{1}{4}$*d.* + 8*s.* 0$\frac{3}{4}$*d.* + £1 10*s.* 4$\frac{1}{4}$*d.* + 11*s.* 8$\frac{1}{4}$*d.* = £12 13*s.* 6$\frac{1}{2}$*d.*

(768) 24$\frac{2}{5}$ loss per cent. (769) 14 men. (770) 3·875; 14·53125; 3·75.

(771) £75 loss of capital. (772) 897. (773) 32 wks.

(774) $\frac{8}{63}$; $\frac{55}{63}$; 1. (775) 46240. (776) £232 15*s.*

(777) £37 19*s.* 9*d.* (778) ·39.

(779) S.I. = £58 9*s.* 7$\frac{1}{2}$*d.*; T.D. = £59 1*s.* (780) 14·9.

(781) 183 guineas. (782) 64$\frac{3}{8}$. (783) £88.

(784) $\frac{3}{4}$. (785) 12 years. (786) £2506071.

(787) £1462 10*s.* (788) 5 lbs. each. (789) £90.

(790) £185 12*s.* 10$\frac{3}{4}$*d.* (791) 5$\frac{23}{60}$; £2. (792) £2000.

(793) ·0073; ·00064; £1 9*s.* 0$\frac{3}{4}$*d.*

(794) T.D. = £13 13*s.*; S.I. = £23 12*s.* 0$\frac{3}{4}$*d.*

(795) 1925 lbs. or 17 cwt. 0 qr. 21 lbs. (796) £196 10*s.*

(797) £720. (798) 30272400 seconds; £31533 15*s.*

(799) 1753. (800) G.C.M. = 2134; L.C.M. = 2464770; £405 3*s.* 4*d.*

(801) £9153 7*s.* 11$\frac{1}{4}$*d.* (802) $\frac{1}{24}$; 11$\frac{50}{111}$.

(803) 11*s.* 11$\frac{1}{4}$*d.*; ·03671875. (804) 45 miles.

(805) £4328 2*s.* 6*d.* (806) ——. (807) 1*s.* 1$\frac{7}{8}$*d.* per lb.

(808) £405 3*s.* 4*d.* (809) 77 yds. 2 ft. 11 in. (810) 4400 yards.

(811) 808899469510. (812) 8 bus. 3 pks. 1 gal. 3 qts.

(813) £117 1*s.* 1$\frac{1}{2}$*d.* (814) £392 19*s.* 3$\frac{1}{4}$*d.* (815) 2$\frac{1}{3}$; 1$\frac{3}{13}$.

(816) $\frac{9}{125}$; 1$\frac{29}{60}$; ·005; 5. (817) 12 minutes.

(818) 880 ft. (819) £72 7*s.* 11*d.* (820) £8 2*s.*

(821) 880 revolutions. (822) 3*s.* 1*d.* per lb.

(823) C. int. = £165 11*s.* 5$\frac{1}{4}$*d.*; S. int. = £163 2*s.* 6*d.*; diff. = £2 8*s.* 11$\frac{1}{4}$*d.*

(824) £417 6*s.* 11$\frac{1}{4}$*d.*; £34 8*s.* 6*d.* (825) $\frac{3}{4}$; 1.

(826) £4. (827) 40; ·37592.

(828) 9*d.*; 5 yds. 1 ft. 6 in. (829) 1 shilling.

(830) 7 hours after latter starting. (831) £75.

2) 9*d*. (833) £5 12*s*. $5\frac{5}{8}$*d*. (834) £1 16*s*. 8*d*.
5) $3\frac{14}{75}$; 0. (836) £2115. (837) $21\frac{3}{25}$ inches.
8) 1*s*. $8\frac{4}{25}$*d*.; 1 fur. 7 po. $1\frac{6}{25}$ yds. (839) ·09015; $11\frac{1}{3}$. (840) £775.
41) 10065 times; $4\frac{4}{5}$ pints left. (842) £180 19*s*. $1\frac{3}{4}$*d*.
43) £68 14*s*. $7\frac{5}{16}$*d*.; £6 18*s*. $1\frac{3}{4}$*d*. (844) 21; 252.
45) $2\frac{1}{8}$; $13\frac{11}{48}$; 121; $\frac{2}{15}$. (846) 3·07930896; 32·86164; ·025; 24·3.
47) 79 ft. (848) £63 19*s*. $1\frac{37}{50}$*d*. (849) £8571 8*s*. $6\frac{6}{7}$*d*.
50) 394; 23·45. (851) $26\frac{1}{2}$ gallons. (852) —
53) — (854) No meaning; former is $\frac{63}{80}$ of latter.
855) $61146\frac{92}{121}$. (856) $15\frac{562}{1155}$. (857) ·03493.
858) $17\frac{1}{2}$ years. (859) 4 hours. (860) £168; £189; £270.
(861) $21\frac{9}{11}$ minutes after 4 o'clock. (862) 228 leaps.
(863) 9 o'clock A.M. (864) 180360360180. (865) £6649 0*s*. 3*d*.
(866) £20 18*s*. $2\frac{1}{4}$*d*. (867) 1056000 steps. (868) 36810 minutes.
(869) £79 10*s*. (870) $18\frac{169}{180}$; $1\frac{49}{57}$; $\frac{83}{86}$. (871) £3 0*s*. $6\frac{3}{4}$*d*.
(872) £410 11*s*. $9\frac{123}{400}$*d*.; £41 11*s*. $10\frac{1}{2}$*d*. (873) $435\frac{5}{17}$ hours.
(874) At end of 2 hours and 9 miles. (875) 30 per cent.
(876) $3\frac{37}{80}$; $1\frac{7}{9}$. (877) 12·39323; ·02415; ·25.
(878) ·0375; ·0$\dot{2}$4175$\dot{8}$; $\frac{32}{625}$; [illegible]. (879) ·052734375; 6*s*. $4\frac{1}{2}$*d*.
(880) £1757 17*s*. $9\frac{1}{2}$*d*.; £547 1*s*. $5\frac{1}{4}$*d*. (881) £419 5*s*.; 430 rupees.
(882) 129 yds. 1 ft. (883) $3\frac{1}{8}$; 17·7; ·17.
(884) $2\frac{1}{2}$*d*.; $26\frac{2}{3}$ per cent. (885) $40\frac{5}{8}$ cwts.
(886) £4687 10*s*.; £164 1*s*. 3*d*. (887) £161 8*s*. $1\frac{23}{25}$*d*.
(888) 7732914. (889) 683; 43029. (890) 8. (891) ·1.
(892) 3·059. (893) £1179 12*s*. $0\frac{1}{4}$*d*. (894) 72 cwts.
(895) 1 lb. at 3*s*. to 2 lbs. at 3*s*. 6*d*. (896) £395 8*s*. 4*d*.
(897) £1380 stock.
(898) C.I. = £120 13*s*. $8\frac{1}{25}$*d*.; S.I. = £112; diff. = £8 13*s*. $8\frac{1}{25}$*d*.
(899) £200. (900) $3\frac{127}{140}$; $1\frac{267}{280}$; $1\frac{127}{420}$; 2 to 1; 3 to 1.
(901) $\frac{97}{5550}$. (902) 16821·346 + Parisian ft.
(903) 9876 ft. and 34566 ft. (904) 3·14159265.
(905) £1. (906) £5121 12*s*. $1\frac{3}{4}$*d*. (907) 11.
(908) 3. (909) 2990; ·0609960. (910) ·15.
(911) $\frac{1}{60}$. (912) 13 tons 16 cwts. 1 qr. 5 lbs.
(913) 562·1. (914) 7 roods. (915) £2 15*s*. $2\frac{1}{2}$*d*.
(916) $9\frac{6}{11}$ minutes; 4, 5, and 6 rounds. (917) ————
(918) £595 15*s*. $0\frac{3}{4}$*d*.; £487 8*s*. $8\frac{1}{4}$*d*.; £379 2*s*. $3\frac{3}{4}$*d*.
(919) 97413; 63. (920) $\frac{5}{18}$; $\frac{7}{32}$.
(921) ·$\dot{2}$4680$\dot{7}$; ·$\dot{2}$1978$\dot{0}$; $\frac{20}{91}$; 2*d*.; ·125. (922) 655·36; 127·65.
(923) $2\frac{2951}{12500}$ lbs. (924) £2737; £3703; £9177. (925) £800.
(926) £210 13*s*. $2\frac{1}{28}$*d*. (927) £5792810 1*s*. 0*d*. (928) $4\frac{1}{4}$.
(929) 34596; 186. (930) $2\frac{2}{5}$ ft., $6\frac{2}{3}$ ft., $3\frac{3}{4}$ ft.; 60 cub. ft.
(931) £166188 4*s*. $1\frac{1}{2}$*d*.; 16 cwts. 3 qrs. 2 lbs. (932) £21 15*s*. $6\frac{3}{4}$*d*.
(933) $2\frac{185}{707}$; $1\frac{64}{189}$; $3\frac{2}{16107}$. (934) 10·07; ·126.

(935) 5*s.* 10*d.*; $\cdot 13\dot{8}$ (936) $4\frac{1}{2}$. (937) £920.
(938) 5*s.* 3*d.* per stone. (939) $4\frac{1}{2}$ years. (940) £835.
(941) £615. (942) A = £517 10*s.*; B = £828; C = £1012 10*s.*
(943) 40 yards. (944) 156. (945) 1.
(946) 1·6; 16; $2\cdot 0\dot{4}\dot{5}$. (947) 2 yds.; 3 oz. 1 dr.; 3*s.* $9\frac{1}{2}$*d.*
(948) 240 days. (949) £2 8*s.* 5*d.* (950) 60 per cent. gain.
(951) A = 7*s.* 2*d.*; B = 6*s.* 10*d.*; C = 6*s.* 0*d.*
(952) A will have $\frac{2}{5}$, each of the others $\frac{1}{5}$.
(953) Four per cent. stock at 120. (954) £13240 17*s.* 6*d.*
(955) $3\frac{24}{25}$, $\frac{5}{14}$. (956) $\frac{8}{15}$; 2 ac. 3 roods 10 po.
(957) 27595·8; ·0275958; 5·92. (958) $\cdot\dot{6}1538\dot{4}$; $\frac{5}{48}$.
(959) ·15625; $1\frac{1}{2}$*d.* (960) 300. (961) £17 6*s.* 8*d.*
(962) $1\frac{2}{18}$; 31·6. (963) 8 days. (964) £5 2*s.* $11\frac{1}{4}$*d.*
(965) £350. (966) £3 10*s.* increase. (967) 177; 3264.
(968) $\frac{11}{12}$. (969) 220·117 + gallons. (970) £7 6*s.* 3*d.*
(971) 2·449 +; ·536 +. (972) $\cdot\dot{1}9753086\dot{4}$; $\cdot 8\dot{3}$. (973) £1 8*s.* $8\frac{8}{9}$*d.*
(974) £36 10*s.* 4*d.*; £2191. (975) £235 10*s.* $10\frac{11}{147}$.
(976) $1\frac{112}{527}$ minute after 4 o'clock P.M. (977) £374.
(978) ·176. (979) 2. (980) $\frac{3}{20}$.
(981) 8*d.* (982) 2766·941 kilos. (983) 40 minutes. (984) £1.
(985) 2728 ac. 3 roods 6 po. $8\frac{3}{4}$ sq. yds.; 6 cwts. 2 qrs. 9 lbs.
(986) 37 persons. (987) 8 shillings. (988) £5417 13*s.* 8*d.*
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